BLM LIBRARY
88027849

BUREAU OF LAND MANAGEMENT
NEVADA

BIOLOGICAL EVALUATION
FOR
MANAGING LIVESTOCK GRAZING IN
DESERT TORTOISE HABITAT

January 1991

Bureau of Land Management
Las Vegas District, Nevada

#27525811 ID 88027849

QL
666
.C5
B564
1991

TABLE OF CONTENTS

BLM LIBRARY
SC-653, BLDG. 50
DENVER FEDERAL CENTER
P. O. BOX 25047
DENVER, CO 80225-0047

Executive Summary ii

I. Introduction 1

II. Proposed Action 1

A. Objectives For Managing Desert Tortoise Habitat In Category I And II Areas, And Certain Category III Areas 2

B. Objectives For Managing Desert Tortoise Habitat In Non-Intensive Category III Areas 3

C. Grazing Management Prescriptions For Desert Tortoise Habitat 4

III. Existing Environment 7

General Information 7

Livestock Grazing 9

Desert Tortoise Study Plots 17

IV. Impacts Of The Proposed Action 24

Desert Tortoise Nutrition 24

Upper Respiratory Tract Disease 30

Predation 32

Desert Tortoise Mortality Rates 34

Livestock Trampling 35

V. Mitigation Measures 36

VI. Incidental Take 38

VII. Interrelated And Interdependent Effects 39

Bibliography 40

EXECUTIVE SUMMARY

This evaluation describes the BLM's proposed action regarding the administration of the livestock grazing program by BLM in desert tortoise habitat on public lands in Nevada as required by Section 7 of the Endangered Species Act of 1973, as amended. Section 7 requires that all Federal agencies "... in consultation with and with the assistance of the Secretary, utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered [and threatened] species ...". The evaluation also addresses, as required by law, the potential impacts of the livestock grazing program on the Federally threatened desert tortoise and potential mitigative measures necessary to reduce those impacts sufficiently to not cause a jeopardy to the species.

The proposed action is to manage livestock grazing under certain prescriptions to achieve certain objectives. These objectives are listed on pages 2 and 3 of this document. The grazing prescriptions include the following:

Prescription 1: In Category I, II and "intensive" III desert tortoise habitat areas, livestock use will not occur from March 1 to June 14. Utilization between June 15 and October 14 shall not exceed 40% on key perennial plant species. Utilization from October 15 to February 28 will not exceed 50% on key perennial grasses and 45% on key shrubs and perennial forbs.

Approximately 1,753,000 acres of allotted public lands are affected by this prescription of which 1,249,000 acres of BLM lands and 45,000 acres of National Park Service (NPS) lands are within active allotments currently grazed during all or part of the spring growing period.

Prescription 2:
Within "non-intensive" Category III desert tortoise habitat, livestock use may occur February 15 to October 14, as long as forage utilization does not exceed 40% on key perennial grasses, forbs and shrubs. Between October 15 and February 14, forage utilization shall not exceed 50% on key perennial grasses and 45% on key shrubs and perennial forbs.

Approximately 1,040,000 acres of allotted public lands and approximately 336,000 acres of NPS lands are affected by this prescription. Approximately 957,000 acres of the above is currently within active allotments.

Prescription 3:
Desert tortoise habitats within the Crescent Peak (4) and Sand Hollow (48) allotments will be managed consistent with the approved AMPs. These AMPs will be sent to the U.S. Fish and Wildlife Service for Section 7 consultation under separate requests. All future AMPs developed will require Section 7 consultation prior to implementation. This prescription is not evaluated in this document.

The Las Vegas District administers 60 grazing allotments in desert tortoise habitat in southern Nevada and the Battle Mountain District administers two. This does not include the four allotments (Azure Ridge, Mesquite Community, Lime Springs, and Terry) that extend into Utah and Arizona from Nevada and are administered by BLM districts in those states. The Crescent Peak and Sand Hollow allotments are under an AMP and will be analyzed separately under a separate Section 7 consultation. Only 58 allotments administered by the Las Vegas District, and two allotments administered by the Battle Mountain District, are analyzed in this consultation. Of these 60 allotments only 42 allotments have been active over the past three to five years (see Attachment I, Table 1. for a list of active and inactive allotments). Another three formally active allotments (Indian Springs, River Mountains, and Sunrise Mountain) in tortoise habitat are unallotted (meaning that no one has grazing privileges to the allotment). Of the 58 allotments, 40 are administered by the Stateline Resource Area (22 active and 18 inactive) and 18 are administered by the Caliente Resource Area (all active).

Livestock grazing is authorized on approximately 3,174,000 acres of desert tortoise habitat in Nevada (excluding the four allotments administered by BLM offices outside the State but including National Park Service Lands) but active grazing use occurs on only about 2,154,000 acres. Another 688,000 acres of public lands administered by the BLM are unalloted for grazing and consequently do not receive any livestock grazing.

The proposed action is to implement the above described grazing prescriptions which will result in the improvement of approximately 1,798,000 acres of Category I, II, and III desert tortoise habitat. Another 1,376,000 acres of Category III desert tortoise habitat should be maintained at current condition or slightly improved.

I. INTRODUCTION

This biological evaluation analyzes the affects of the Bureau of Land Management's (BLM) proposed livestock grazing program, including domestic sheep, cattle, and horse use, on the federally threatened desert tortoise (Gopherus agassizii) in southern Nevada. The evaluation includes all grazing allotments managed by the Bureau of Land Management in Nevada including those allotments on National Park Service lands where the BLM administers the grazing. All of the allotments are managed by the BLM Las Vegas District except for: Montezuma and Razorback allotments (which are managed by the Tonapah Resource Area, BLM Battle Mountain District), Azure Ridge and Mesquite Community allotments (both of which are managed by the BLM Arizona Strip District, Shivwitts Resource Area, St. George, Utah), and the Terry allotment (managed by the Dixie Resource Area, BLM Cedar City District, St. George, Utah).

The desert tortoise was first listed as a Federal endangered species under a 240 day emergency ruling on August 4, 1989. This ruling covered all desert tortoises (except captive animals) throughout their habitat in the Mohave Desert including Nevada. On April 2, 1990, the U.S. Fish and Wildlife Service (U.S. FWS) listed the desert tortoise permanently as a federally threatened species.

Sixty-six allotments are within desert tortoise habitat in Nevada. Sixty of these are administered by the Las Vegas District, two by the Battle Mountain District, and four by BLM districts in Utah and Arizona. Allotments administered by out-of-state BLM offices will be included in their own Section 7 consultations. Two allotments under allotment or resource management plans within the Las Vegas District will not be analyzed in this document as they will be consulted on separately.

New range improvement projects will require individual Section 7 consultations with the U.S. Fish and Wildlife Service (FWS) as they are proposed in the future. This consultation does not cover existing range improvement projects nor is it anticipated that consultation will be necessary for these projects.

II. PROPOSED ACTION

The following objectives and grazing prescriptions have been developed to meet the habitat needs of the desert tortoise, as those needs are influenced by livestock grazing, consistent with the BLM's "Desert Tortoise Rangewide Plan". The emphasis is to manage more intensively in Category I and II desert tortoise habitat areas and, where appropriate, in some Category III habitat areas (intensive Category III areas). Category III areas identified for more intensive management are those areas adjacent to Category I and II tortoise habitat areas or those areas that provide a

corrider between Category I and II areas (see the attached Map for their locations). Intensive management areas are those habitat sites considered to be essential or important for maintaining viable desert tortoise populations indefinitely in Nevada. These areas will be managed to achieve increased recruitment, reduced mortalities, reduced occurrence of osteoporosis or similar conditions, and population structures that will result in healthy, vigorous populations. Most Category III desert tortoise habitat areas (non-intensive areas) will be managed to sustain existing population levels.

A. OBJECTIVES FOR MANAGING DESERT TORTOISE HABITAT IN CATEGORY I* AND II AREAS, AND CERTAIN CATEGORY III AREAS (See the attached Map)

1. Manage the native ephemerals and perennials to ensure that plant species reach their full growth potential between spring and early fall, based on phenological stage (seed dissemination). Provide the tortoise with those plant portions that provide the best source of nutrition and provide optimum plant reproduction.

2. Manage for a perennial native grass composition (by dry weight) of at least 15%, with no individual species exceeding 40% of the total perennial grass component, and including 5% total dry weight of bush muhly, or as limited by PNC of the range site.

3. Manage for at least 5% ground cover of perennial native grass species with warm season grass species no greater than 60% of total, or as limited by PNC.

4. Maintain a canopy cover of at least 20% or as limited by PNC.

5. Reserve a minimum of 150 lbs. air dry spring ephemeral forage per acre, to ensure maximum availability of desirable (native) ephemeral forage. *(150 lbs. of air dry spring ephemeral forage is only produced in normal to above normal precipitation years at most range sites within the Mohave Desert of southern Nevada. Higher production requirements could seldom be achieved and therefore are not pratical.)*

6. To accomplish the overall goal of maintaining/achieving viable tortoise populations; manage the habitats for tortoises such that:

   a. average annual adult mortality does not exceed 2% over a five year period;

   b. less than 5% of animals below age class 6 should demonstrate osteoporosis (thinning of the bone);

c. average annual recruitment rate is 3-5% (immature into the adult class) over a five year period;

d. adult sex ratio is at least 1:1;

e. age structure is at least 40% adult and 60% immatures and juveniles as determined through:

1) census plots
2) % of individual tortoises registered
3) with a sample size of at least 30 individuals

B. OBJECTIVES FOR MANAGING DESERT TORTOISE HABITAT IN NON-INTENSIVE CATEGORY III AREAS

1. Manage for a perennial native grass composition by dry weight of at least 3 to 5 percent or as limited by potential natural community (manage for at least 5 percent ground cover of perennial native grass species).

2. Maintain a canopy cover of at least 15%, or as limited by PNC.

3. Manage habitat to ensure tortoise recruitment is sufficient to maintain a stable population.

** For the purpose of meeting the above objectives, the upper limits of production of desireable plant species as described for the potential natural community (PNC) for each range site should be achieved. Potential natural community is that vegetative community that is at its highest successional stage that could be obtained were it not for the affects of man or natural phenomena that would have the affect of causing the community to be at a lower successional stage. It is assumed that the closer the vegetative community is towards reaching its maximum potential towards a truly natural condition unaffected by man, the better that community will meet the needs of the desert tortoise. This is because the natural community in many cases, particularly as it relates to the Mohave Desert, is representative of a more diverse plant community with a more complex horizontal and vertical plant structure. This provides not only an increase in forage availability of desireable plant species but also increased ground cover, both of which would benefit the desert tortoise.*

C. GRAZING MANAGEMENT PRESCRIPTIONS FOR DESERT TORTOISE HABITAT

Prescription 1:
In Category I, II, and "intensive" III desert tortoise habitat areas (see the attached Map), livestock use will not occur from March 1 to June 14. Utilization between June 15 and October 14 shall not exceed 40% on key perennial plant species. Utilization from October 15 to February 28 will not exceed 50% on key perennial grasses and 45% on key shrubs and perennial forbs (see Table 1).

Prescription 2:
Within "non-intensive" Category III desert tortoise habitat, livestock use may occur February 15 to October 14, as long as forage utilization does not exceed 40% on key perennial grasses, forbs and shrubs. Between October 15 and February 14, forage utilization shall not exceed 50% on key perennial grasses and 45% on key shrubs and perennial forbs.

Prescription 3:
Desert tortoise habitats within the Crescent Peak (4) and Sand Hollow (48) allotments will be managed consistent with the approved AMPs. These AMPs will be sent to the U.S. Fish and Wildlife Service for Section 7 consultation under separate requests. All future AMPs developed will require Section 7 consultation prior to implementation.

All three prescriptions shall include the following key species where appropriate by density and availability: galleta grass (Hilaria jamesii and rigida), bush muhly (Muhlenbergia porteri), sand dropseed (Sporobolus cryptandrus), Indian ricegrass (Oryzopsis hymenoides), black grama (Bouteloua eriopoda), and desert needlegrass (Stipa speciosa). Key shrubs species, where appropriate by density, shall be: range ratany (Krameria parvifolia), ephedra (Ephedra spp.), white burrobrush (Hymenoclea salsola) and winterfat (Eurotia lanata).

Within allotments classified as ephemeral, the number of livestock to be licensed during a particular period will be based upon the availability of forage consistent with the season of use and utilization level restrictions identified in the grazing prescriptions. Within allotments classified as ephemeral-perennial and perennial, licensed use will be based upon active preference. These numbers will be modified if necessary, to be consistent with Bureau regulations and policy, and meet the utilization objectives described above. Once proper use levels are met (prescriptions 1 and 2), the livestock operator will be required to move livestock from the affected area.

Utilization monitoring studies in ephemeral allotments will be conducted at least once every three months during the active

grazing period to determine utilization levels and potential availability of forage for the next license period. Utilization studies will be conducted at least twice annually in other classified allotments (once in late summer or early fall, and once at the end of the plant dormant period just prior to spring green up). These studies will be conducted at existing key areas. In allotments without established key areas, new key areas will be located by range and wildlife specialists. These new key areas will be established within 3/4 mile from reliable waters where possible and consistent with overall management objectives. If existing key areas are insufficient to adequately monitor potential impacts of grazing on forage resources, additional utilization studies may be added, as determined by an inter-disciplinary team of range and wildlife specialists. Plant species composition represented in the general habitat area should in included in each key area. Use-pattern-mapping will also be conducted on an annual basis. Range monitoring studies will only be conducted on active allotments.

Vegetative trend studies will be established within each allotment managed under prescription 1 within one year of receipt of the biological opinion and within three years for allotments managed under prescription 2.

Desert tortoise study plots (sq. mile) will continue to be surveyed every three to four years. Additional plots will be established, as mutually determined by BLM, NDOW, and FWS personnel.

Ecological condition classes (ECC) will be determined for each of the allotments affected by prescriptions 1 and 2, with prescription 1 allotments receiving higher priority. In the Stateline Resource Area, an order III soil survey, to help ascertain ECC, must first be completed if funding is available. The BLM and FWS will meet annually to discuss the progress and establish strategy for ecological mapping.

An annual report will be submitted to the FWS by December 15th of each year which will include a summary of grazing licenses issued and the results of monitoring conducted in the prior fiscal year.

Table I identifies which allotments or portions of allotments will be managed under each prescription. In most cases, where allotments have significant amounts of both intensive and non-intensive management areas, the allotment will be managed according to the category of tortoise habitat affected. In allotments where the tortoise habitat is predominantly of one category, all tortoise habitat will be managed by the prescription identified for that category. For example, the White Basin allotment contains 169,000 acres of non-intensive Category III habitat but only 3,000 acres of Category II habitat. In this case, all tortoise habitat will be managed per prescription 2. However, in most cases, the grazing

prescription will be applied specific to the categories of habitat within the allotment.

Table 1*

Allotments Where Grazing Prescriptions 1 and 2 Shall Be Applied

Allotment* Map Number	Allotment Name	Resource Area	Active Preference** or Average Licensed Use by Season	Acres Within Prescription 1 (in 000's)	Acres Within Prescription 2 (in 000's)
1	South Pointe	Stateline	Not Active	10	6
2	Christmas Tee Pass	Stateline	76 CYL	54	16
3	Ireteba Peaks	Stateline	162 CYL	201	67
5	McCullough Mtn.	Stateline	292 CYL	119	-
6	Jean Lake	Stateline	208 CYL	71	-
7	Hidden Valley	Stateline	76 C March-May & Dec.-Feb.	37	-
8	Roach Lake	Stateline	21 CYL	12	-
9	Table Mountain	Stateline	Not Active	31	4
10	Black Butte	Stateline	Not Active	13	29
11	Spring Mountain	Stateline	Not Active	132	-
12	Stump Spring	Stateline	Not Active	21	-
13	Younts Spring	Stateline	Not Active	12	-
14	Wheeler Wash	Stateline	131 C March-May	27	-
15	Mt. Stirling	Stateline	13 CYL	14	89
17	Wheeler Slope	Stateline	Not Active	27	-
18	Lucky Strike	Stateline	17 HYL	38	-
19	Kyle Canyon	Stateline	Not Active	10	-
22	Dry Lake Valley	Stateline	Not Active	23	-
23	Muddy Mtns	Stateline	Not Active	78	79
24	White Basin	Stateline	46 CYL	-	172
25	Gold Butte	Stateline	296 CYL	31	76
27	Billy Goat Peak	Stateline	116 CYL	17	-
30	Bunkerville	Stateline	223 CYL	79	30
31	Hen Springs	Stateline	111 CYL	31	-
32	Lower Mormon Mesa	Stateline	44 C March-May Dec.- Feb.	48	-
33	Overton Arm	Stateline	Not Active	-	5
34	Mesa Cliff	Stateline	Not Active	-	13
35	Newberry Mtns	Stateline	Not Active	26	9
36	Muddy River	Stateline	Not Active	6	18
37	Glendale	Stateline	Not Active	9	15
38a	Rox/Tule	Caliente	70 CYL	27	-
38b	Rox	Stateline	30 C Dec.-Feb.	20	-
39	Acton Ferrier	Stateline	12 C March-May	41	-
40	Pittman Well	Stateline	Not Active	30	-
41	Ute	Stateline	Not Active	18	12
42	Arrow Canyon	Stateline	22 C March-May Dec.- Feb.	59	24
43	Upper Mormon Mesa	Stateline	58 C March-May Sept. - Feb.	47	-
44	Toquop Sheep	Stateline	1399 S March - May	27	-
45	Flat Top Mesa	Stateline	15 C/H March - May Nov. - Feb.	-	5
46	Pulsipher Wash	Stateline	Not Active	-	3
47	Jackrabbit	Stateline	30 C March - May Dec. - Feb.	3	9
49	Gourd Spring	Caliente	415 C Oct. - May	38	20
50	Mormon Peak	Caliente	60 C June - March	7	-

Table 1 (cont.)*

Allotments Where Grazing Prescriptions 1 and 2 Shall Be Applied

Allotment* Map Number	Allotment Name	Resource Area	Active Preference** or Average Licensed Use by Season	Acres Within Prescription 1 (in 000's)	Acres Within Prescription 2 (in 000's)
51	Breedlove	Caliente	60 CYL & 20 HYL	113	-
52	Delamar (Pasture 5)	Caliente	464 CYL	39	-
53	Grapevine	Caliente	93 C Oct. - March	10	30
54	Morrison-Wengert	Caliente	205 CYL	-	55
55	Henrie	Caliente	204 C Nov. - April	30	31
56	White Rock	Caliente	360 C Oct. - May	-	25
57	Summit Spring	Caliente	90 C Oct. - May	-	17
58	Beacon	Caliente	2,095 (AUMs) S March-May		7
59	Snow Springs	Caliente	475 C Oct. - March	9	38
62	Garden Springs	Caliente	348 C & 4 H Oct-May	-	22
63	Boulder Springs	Caliente	70 C Oct. - March	-	8
66a	Lower Lake West	Caliente	104 CYL	-	13
66b	Lower Lake East	Caliente	54 CYL	40	-
67	Pahranagat East	Caliente	52 C Aug. - May	11	-
68	Pahranagat West	Caliente	212 C Aug. - May	-	16
70	Montezuma	Tonapah	889 CYL	-	60
71	Razorback	Tonapah	112 CYL	-	24
			TOTAL	1,753	1,040

*The Azure Ridge (26), Mesquite Community (29), and Lime Springs (28) are administered by the Shivwitts Resource Area of the Arizona Strip District in St. George, Utah. The Terry Allotment (60) is administered by the Dixie Resource Area of the Cedar City District out of St. George, Utah. These offices will initiate Section 7 consultation for the allotments they administer. The Lime Mountain, Elgin, and Six Mile allotments shown on the attached map are not within desert tortoise habitat and therefore are not reflected in the above table. The Indian Springs, River Mountains, and Sunrise Mountain allotments are no longer allocated and therefore will not receive any grazing use and are not included in the above table. Tortoise habitat within these allotments are reflected in the acreage identified as unalloted.

**CYL = cows yearlong etc., C = cattle, S = sheep, & H = horses

All the allotments in Caliente are classified as perennial and have active preferences identified with them. In many cases, the actual licensed use on any given year may be much lower than the active preference identified. The allotments in Stateline are classified as ephemeral and consequently do not have an active preference. The livestock use identified in the above table are based upon an average licensed use of the past five years. A few allotments have only been used one or two years over the past five years. In these situations, the average used is for those years when grazing actually occurred and does not reflect unused years. In some of the allotments, the use described in the table above does not truly reflect actual use in tortoise habitat. For example, approximately 131 cows graze the Wheeler Wash allotment annually between March and May. However, livestock use in the allotment occurs in the higher elevations and consequently desert tortoise habitat is not actually grazed.

III. EXISTING ENVIRONMENT

General Information

Grazing is authorized with ten year permits. Most of the 10 year permits on allotments for range classified as ephemeral were issued in 1983. The grazing preference for an ephemeral allotment is the area of use and kind of livestock, not numbers of animals or season of use. Federal discretionary authority is exercised on ephemeral allotments when use is authorized upon application by the grazing permittee. Authorizations are valid for up to three (3) months pursuant to any management requirements. This is done only after the resource staff conducts a field investigation to determine if forage is available or if climatic conditions indicate the probability of an ephemeral forage crop. Ten year permits for ephemeral-perennial and perennial allotments have been issued over a number of years resulting in several permits up for renewal each year. These permits not only prescribe a preference for area of use and class of livestock, but also provide a preference of livestock numbers and season of use. Federal discretionary authority is exercised at the beginning of each grazing season.

The BLM manages approximately three million acres of the roughly five million acres of desert tortoise habitat in Nevada. Following the BLM's "Desert Tortoise Habitat Management on the Public Lands: A Rangewide Plan" (Rangewide Plan) approximately 2.7 million acres of desert tortoise habitat were classified as Category I, II, and III habitat areas on August 8, 1989. These categories include approximately 341,400 acres of Category I habitat, 643,600 acres of Category II habitat, and 1,704,800 acres of Category III habitat. Another 138,250 acres of contiguous habitat managed by the U.S. Fish and Wildlife Service's Desert Game Range was also categorized as category I and II habitats. Desert tortoise habitat within the BLM's Las Vegas Valley Subunit (as identified in the Clark County MFP) was not categorized due to its proximity to the Las Vegas urban area.

Within Nevada, the desert tortoise occurs primarily in the Mohave Desert Biome below 4,200 feet elevation. Tortoises occur to a lessor extent along the interface of the Mohave and Great Basin Deserts, represented by the black brush vegetative community.

In 1989, approximately 1400 1.5 mile long desert tortoise transects were evaluated to quantify the extent of various relative densities of desert tortoises on BLM lands in Nevada. Because some habitat areas appeared to have relative densities that did not fall clearly into a particular group (i.e. low density) but rather appeared to be at the high end of that group, habitat areas were lumped into low (<20 tortoises/sq.mi.), low-moderate (20-70 tortoises/sq.mi.), moderate (50-100 tortoises/sq.mi.), and moderate-high (80-150 tortoises/sq.mi.) categories. Approximately 223,000 acres of tortoise habitat support moderate-high densities, 491,000 acres support moderate densities, and 493,000 acres support low-moderate densities. All other tortoise habitat on BLM lands are believed to support low desert tortoise densities (i.e. <20 tortoises/sq.mi.).

The climate consists of cool winters and hot summers, with 3 to 10 inches of annual precipitation with low-intensity uniformly distributed winter storms and scattered, high-intensity summer storms.

The major physiographic parts of the valleys within desert tortoise habitat are the Piedmont slopes and the basin floors. The three major landform types of the Piedmont slopes are erosional fan remnants, inset fans, and fan skirts. The basin floor is comprised mainly of stream terraces with intermingled broad washes that are occasionally flooded. The vegetation community is creosote/white bursage, or creosote/white bursage/yucca spp.. The herbaceous understory varies from, predominantly a mixture of introduced and native annual forbs and grasses in the lower elevations, to perennial grasses with annuals in the higher elevations. Black brush communities comprise some of the higher alluvial fan remnants.

Tortoise density and distribution in Nevada appears to be associated with certain soil characteristics and vegetative productivity (Wilson/Stager). Dr. Hardy, as quoted in E. Jaegers Desert Wildlife (1961) concluded that soil types largely determine habitat and distribution of the desert tortoise. Hardy determined that the soil must be sufficiently free from rocks to permit digging and compact enough to maintain a strong archway over the burrow. Woodbury and Hardy (1948) and Miller and Stebbins (1964) found that tortoise habitat types are restricted to suitable soil types for den construction. Luckenbach (1976) noted that preferred habitat types in the Providence Mountains region were areas with good denning potential having soil characteristics of sandy loam to light gravel clay.

After analyzing the soil properties of the major soil types in each mapping unit in the Piute Valley, tortoise density and distribution appear to be associated with certain soil characteristics. Soil types are classified by: temperature, precipitation, placement on the landform, and elevation. Soil characteristics identified were; available water capacity (AWC), soil consistence, depth to a limiting layer, rock fragment content, soil salinity, soil temperature, and frequency of flooding. These soil characteristics can be used to evaluate soil types for potential vegetative productivity and suitability for construction of tortoise dens.

Livestock Grazing

The Las Vegas District administers 60 grazing allotments in desert tortoise habitat in southern Nevada and the Battle Mountain District administers two. This does not include the four allotments (Azure Ridge, Mesquite Community, Lime Springs, and Terry) that

extend into Utah and Arizona from Nevada and are administered by BLM districts in those states. The Crescent Peak and Sand Hollow allotments are under an AMP and will be analyzed separately under a separate Section 7 consultation. Only 58 allotments administered by the Las Vegas District, and two allotments administered by the Battle Mountain District, are analyzed in this consultation. Of these 60 allotments only 42 allotments have been active over the past three to five years (see Attachment I, Table 1. for a list of active and inactive allotments). Another three formally active allotments (Indian Springs, River Mountains, and Sunrise Mountain) in tortoise habitat are unallotted (meaning that no one has grazing privileges to the allotment). Of the 58 allotments, 40 are administered by the Stateline Resource Area (22 active and 18 inactive) and 18 are administered by the Caliente Resource Area (all active).

Livestock grazing is authorized on approximately 3,174,000 acres of desert tortoise habitat in Nevada (excluding the four allotments administered by BLM offices outside the State but including National Park Service (NPS) lands) but active grazing use occurs on only about 2,154,000 acres. Another 688,000 acres of public lands administered by the BLM are unalloted for grazing and consequently do not receive any livestock grazing.

The BLM also administers livestock grazing on approximately 464,000 acres of the Lake Mead National Recreation Area. Approximately 381,000 acres of this is desert tortoise habitat. Though officially uncategorized, approximately 45,000 acres in the Cottonwood Cove area of Lake Mead essentially qualifies as Category II habitat. Table 2 below lists those allotments and associated desert tortoise habitat that extend into the Lake Mead National Recreation Area.

Table 2
Allotments Extending Onto Park Service Lands

Allotment (Map #)	Total Acres	Desert Tortoise Habitat	Non-Tortoise Habitat
Christmas Tree Pass (2)	26,000	17,000	9,000
Ireteba Peak (3)	158,000	118,000	40,000
Muddy Mountain (23)	62,000	62,000	0
White Basin (24)	95,000	94,000	1,000
Gold Butte (25)	80,000	56,000	24,000
Bunkerville (30)	7,000	7,000	0
Newberry Mountain (35)	36,000	27,000	9,000
TOTALS	464,000	381,000	83,000

All allotments within the Stateline Resource Area are classified as ephemeral allotments with the exception of the Mt. Stirling Allotment which is classified as ephemeral-perennial. All allotments in the Caliente and Tonapah resource areas are classified as perennial. Ephemeral allotments are allotments in which a grazing preference only exists for a particular geographic area and particular class of livestock. The number of livestock allowed to graze in any particular year is based upon the availability or potential production of forage. Perennial allotments are allotments in which a preference is also established for a particular number and class of livestock within a particular geographic boundary.

Cattle is the predominate kind of livestock licensed within tortoise habitat in Nevada. A few horses are occasionally licensed in conjunction with cattle. The Lucky Strike allotment is the only allotment licensed solely for domestic horses (17 head yearlong). The operator in the Flat Top Mesa allotment sometimes licenses horses instead of cattle - usually about 15 head. Domestic sheep are only licensed in three allotments: the Toquop Sheep allotment, Beacon allotment, and the Beacon duel use area which covers approximately 26,000 acres of desert tortoise habitat in the Gourd Spring allotment. Total desert tortoise habitat grazed by domestic sheep is approximately 60,000 acres. Most is in Category I and II tortoise habitat. Domestic sheep use generally occurs mid-to-late March through mid May. The five year average licensed use in the Toquop allotment is 1,399 sheep. The active preference for the Beacon allotment is 2,095 AUMs for sheep though the actual licensed use is generally less. The Beacon duel use area of the Gourd Spring allotment is used for trailing sheep from the Toquop allotment to the Beacon allotment and back. These allotments are generally used for lambing operations.

Within the Stateline Resource Area, approximately 65% of the total acreage in the resource area is grazed during any given year, with some of the remaining 35% having been inactive up to 25 years. Approximately 12 allotments, depending on the year, usually have livestock grazing on a year round basis. These include: Christmas Tree Pass, Ireteba Peaks, McCullough Mountain, Jean Lake, Roach Lake, Mt. Stirling, Lucky Strike, White Basin, Gold Butte, Billy Goat Peak, Bunkerville, and Hen Springs. These allotments encompass approximately 1,117,000 acres of desert tortoise habitat. The remaining allotments generally receive grazing use ranging from 3 to 9 months usually between March and May and October or December through February. The allotments which have received year-round use account for approximately 85% of the total active use in the Stateline Resource Area. Utilization levels or total number of livestock use levels declined 30% in 1989 and are expected to decline by 50% in 1990. This has been the norm for the last 5 years, mainly due to the 4 year drought. In numbers of AUM'S, the

Stateline Resource Area collected grazing fees for approximately 20,000 AUM'S for 1989. The number will be lower for 1990. Use of the Montezuma and Razorback allotments, though yearlong allotments, generally occurs only during the fall or winter, as most of these allotments lie to the north of Beatty (north of tortoise habitat). These two allotments overlap approximately 84,000 acres of Category III desert tortoise habitat.

Grazing in the Caliente Resource Area is based upon active preference (see Attachment 1, Table 1: stocking levels in both resource areas). Only six of the 18 allotments in Caliente (those in tortoise habitat) receive yearlong use. These include Rox/Tule, Breedlove, Delamar, Morrison/Wengert, Lower Lake West, and Lower Lake East. They occur on approximately 219,000 acres of Category I, II, and "intensive" III habitat areas and 68,000 acres of other Category III habitat. However, virtually all livestock use in the Delamar allotment occurs north of desert tortoise habitat which includes only pasture 5 of the allotment. Allotments used seasonally in Caliente are generally used October through May with some use extending outside this period (Table 1)

Livestock grazing in the Las Vegas District, specifically in Stateline and southern Caliente Resource Areas is dependent on available forage and water from springs, wells and water hauls. The amount of available forage is variable from year to year and even month to month. The vegetation reacts to seasonal precipitation, with the majority of growth occurring during spring or late summer. Waters are limited, but do not appear to significantly affect proper livestock distribution.

Livestock are permitted on ephemeral allotments only when forage is available or there is the potential for vegetative growth. The potential is determined by digging holes in the soil and examining the depth of soil-moisture penetration. If the soil is moist to a depth of 4 inches or more, an excellent potential exists for the perennial forage to produce a viable forage base. It is difficult to predict the annual production because it only takes one warm or hot dry wind to deplete the top 1 to 2 inches of soil moisture. Without this moisture, the chances of an annual forage crop are limited. During September 1990, precipitation came at the proper time for a late season bloom of annual and perennial forage species. Field observations indicated a large production of annuals and perennials due to the timing and quantity of the precipitation.

Historically, grazing use was based on perennial forage until all allotments in Clark County were classified as ephemeral under the Special Rule for Ephemeral Range, published in the Federal Register (Vol. 33, No. 238, December 7, 1968) and approved by the Nevada State Director of the Bureau of Land Management (BLM) on November 13, 1969. Title 43 of the Code of Federal Regulations (CFR),

4120.4 (a) states in part that "When a State Director determines that local conditions require a special rule to achieve improved administration consistent with the objectives of this part, the Director may approve such rules."

In accordance with the Land Use Plans and Grazing Environmental Impact Statements for both the Stateline and Caliente Resource Areas, studies have been or will be established in each active allotment. It will be determined if management objectives have been met, if current management practices are adequate and what, if any, changes are needed. The types of studies required depend upon the intensity of management needed for each allotment and the types of resource conflicts. All allotments are ranked according to the intensity of management needed, for instance, "I" allotments are the most intensely managed with the majority of these allotments having frequency trend, cover, utilization, use pattern mapping, and photo trend studies conducted. "M" allotments (maintain current management levels) usually have utilization transects and use pattern mapping conducted, and "C" allotments (custodial) have use pattern mapping conducted on a yearly basis.

Tables A1 and B1 in Attachment I, identify each allotment where studies were conducted and the type of studies for both resource areas. Table A1 depicts: the management category, whether the allotment was active or inactive within the last 3 to 5 years, and those allotments which have not been used since 1985 within the Stateline Resource Area. Table B1 depicts the kinds of studies established by allotment and whether the allotments are active or inactive for the Caliente Resource Area.

Within the Stateline Resource Area, the rangeland is generally in excellent condition with an estimated 2,015,472 acres in late seral condition and 817,470 acres in PNC. However, 42,808 acres are in Early seral condition and 178,583 acres are in Mid seral condition. Table 3 indicates the amount of acreage per seral stage, the percent of the Stateline Resource Area per seral stage, and the ecological status of the Crescent Peak allotment where a survey was completed for 47,352 acres in 1988. See Attachment 1, Table A2, for a breakdown of the estimated ecological status on an allotment basis.

Table 3: Ecological Status for the Stateline Resource Area.

ECOLOGICAL STATUS (Stateline Resource Area)					
	Acreage	Early	Mid	Late	PNC
Total Acreage in the Stateline Resource Area	3,054,333	42,808	178,583	2,015,472	817,470
Percent of Resource Area Per Seral Stage		1%	6%	66%	27%

Ecological status is the present state of vegetation and soil protection of an ecological site in relation to the potential natural community for the site. Vegetation status is the expression of the relative degree of which the kinds, proportions, and amounts of plants in a community resemble those of the potential natural community. The potential natural community is that plant community best adapted to a unique combination of environmental factors.

The purposes of a completed ecological survey are as follows:

1. Provide a basis for establishment and monitoring management objectives.

2. Provide information for the evaluation of a Resource Management Plan.

3. Establish a reference point from which impacts or changes in resource condition can be quantitatively analyzed.

4. Provide a basis for the manager to compare or monitor the extent and direction of changes in plant community as a result of specific management treatments.

5. Aid in determination of where to locate key management areas.

In the Stateline Resource Area, the acreage figures were estimated using professional opinion and actual survey work completed in Piute Valley (Crescent Peak Allotment: Table 4). It is important to note that the majority of the ecological sites in the Stateline Resource Area are shrub dominant. These types of sites normally rate higher ecologically. The percent allowable shrub production (dry-weight-basis) of the potential natural community may be as much as 75-80%, depending on the ecological site description.

Table 4: Ecological Status for the Crescent Peak Allotment.

ECOLOGICAL STATUS (Crescent Peak Allotment)					
Allotment and Associated Tortoise Habitat	Acreage	Early	Mid	Late	PNC
Crescent Peak	47,352	0	4,749	40,184	2,419

The Caliente Resource Area identified one allotment where ecological survey had been completed. Ninety-six percent of this allotment (Grapevine) was rated as in late seral or at potential natural community. The ecological status for the remaining allotments have not been completed. Table 5 shows the ecological status of the Grapevine Allotment.

Table 5: Caliente Resource Area Ecological Status By Allotment.

ECOLOGICAL STATUS (Grapevine Allotment)						
Allotment and Associated Tortoise Habitat	Acreage	Early	Mid	Late	PNC	ESI Total Acres
Grapevine	33,328	0	1165	14,597	27,416	43,178

Utilization levels are determined using the Key Forage Plant Utilization Method. It is conducted by establishing a transect within an ecological site selected as a key area **(1)**. The transect should have a known reference or starting point and is surveyed along the same direction each year as determined by compass bearing. Observations are usually made five paces apart but may vary depending on the type and/or size of key area. At each observation point, utilization of the nearest key species **(2)** within a 180 degree arc five feet from the toe of the boot is recorded using six utilization classes. Usually, each key species is observed 30 to 40 times per transect.

(1) Key Area. A relatively small portion or a pasture of management unit selected because of its location, use or grazing value as a monitoring point for grazing use. It is assumed that key areas, if properly selected, will reflect the overall acceptability of current grazing management over the pasture or unit as a whole.

(2) Key Species. (1) Forage species of sufficient abundance and palatability to justify their use as indicators to the degree of use of associated species. (2) Those species which

must, because of their importance, be considered in the management program.

Most key areas are located within 1 to 1.5 miles of water. Several allotments, such as Jean Lake and Bunkerville have key areas located 2 miles from water. Lucky Strike and Crescent Peak Allotments have key areas within one mile of water.

Forage utilization levels are divided into six categories: 0% = no use, 1%-20% = slight use, 21%-40% = light use, 41%-60% = moderate, 61%-80% = heavy use and 81%-100% = severe use. Areas of similar use are mapped on topographic quads with the acreage of each area determined by use of a planimeter. As expected, use is generally heavy around waters, with a gradual to abrupt decline away from water.

The majority of key areas and associated key species have received use levels below 55% for grasses and 45% for shrubs and forbs, which are within current management prescriptions. Tables A3 and B3 in Attachment I show the number of key areas for each allotment, number of years transects have been surveyed in each key area, key forage species, and average percent use per key species. The value reported as the average percent use of key species was determined by adding the percent use per key species by year and dividing that number by the number of years data was collected. This value is an average of the number of years data was collected for each key species in each key area, and may not indicate what is really happening in the key area. Allotment evaluations have identified areas that have been over-utilized in the past and management prescriptions were identified to correct the problem. In recent years southern Nevada has experienced a drought which has lead to higher utilization levels than normal in a few allotments. The majority of allotments showed lower utilization than usual because stocking rates were reduced in response to the drought.

Use pattern maps show use zones based on the proportion of current year's forage production that was consumed by grazing animals. Tables A4 and B4 in Attachment I display use levels by acres within each allotment where use pattern mapping was completed. A number of C (custodial) allotments were grazed but no use pattern map was completed. The monitoring effort was centered around those allotments categorized as I (improve) or M (maintain).

Approximately 4% of the acreage in active allotments in the Stateline Resource Area, and 13% of the acreage mapped in the Caliente Resource Area received use levels that were heavy to severe. It can be expected that 1-2% of the acreage identified as moderate use could have exceeded the allowable use levels of 55% for grasses and 45% for shrubs for both resource areas around waters. Approximately 91% of the acreage in active allotments in the Stateline Resource Area and 65% in Caliente received slight to

light grazing, with use levels of less then 40%. The majority of the rangeland received acceptable levels of use.

Trend information is important in determining the effectiveness of on-the-ground management actions and evaluating the progress toward these objectives. It indicates whether the rangeland is moving toward or away from its potential or specific management objectives. The Stateline Resource Area used both apparent and measured trend.

Apparent trend is an interpretation of trend based on a single observation. An assessment, using professional judgement, is based on a one time observation. It includes consideration of such factors as plant vigor, abundance of seedlings and young plants, accumulation or lack of plant residues on the soil surface, and soil surface characteristics (i.e., crusting, gravel pavement, pedicled plants and sheet or rill erosion).

Measured Trend is the quantitative assessment of change based on repeated measurements over time, of the variety, proportion, and frequency of plant species. It also includes the observation and documentation of the same factors used for determining apparent trend.

Trend was measured using photo plots, professional judgement, and frequency measurements. Two allotments have permanent photo plots and seven have a photo plot along the center line of the frequency transect baseline. In most allotments, a combination of the three methods was used to determine trend. Table A5, Attachment I shows whether trend was measured using apparent or measured trend, and if the allotment is in a downward, static, or upward trend for the Stateline Resource Area. The data indicates that the trend in the majority of the allotments is static with some areas having downward or upward trend. Trend data was not available for the Caliente Resource Area.

Desert Tortoise Study Plots

Nine square-mile tortoise study plots have been surveyed on BLM lands in Nevada: Last Chance, Sheep Mountain, Christmas Tree Pass, Gold Butte, Trout Canyon, Mormon Mesa, Coyote Springs Valley, Sand Hollow and Piute Valley. The first plots were established in 1979. The Piute Valley study plot has been surveyed four times, Sheep Mountain and Gold Butte have been surveyed twice, and all other study plots have been surveyed only once. A summary of the study plot data is provided in Attachment 2.

Last Chance Study Plot / No Grazing Allotment:

This study plot was established in the spring of 1980 and is located approximately nine miles northwest of Pahrump and 3.4 miles west of State Highway 16 (T18S, R52E, Sec. 34 and S1/2 S1/2 Sec. 33, and T19S, R52E, N1/2 N1/2 Sec. 4). Alice Karl surveyed the plot under contract for BLM. Because of low tortoise observations, the plot was extended from the original one square mile to 1.5 square miles. The plot was surveyed for 30 field days.

Ten tortoises were located (9>180mm, 1≤180mm) during the survey and 53 tortoise remains were found. Age class ratio, >180mm (adults and subadults) to ≤180mm (immatures, juveniles, and hatchlings) was 9:1. The population estimate was 5-10 tortoises per square mile, with an estimated crude mortality rate 59%. (Karl, 1980).

Of particular concern was the large percent (78%) of what Karl believed to be reproductively senescent animals. Due to ratio of old to young tortoises, and an extremely high crude mortality rate, Karl believed the tortoise population could collapse within ten years. The plot has not been re-surveyed to determine the current status.

Human activity included occasional ORV trails. Ten of the mortalities had predator chew marks. However, it is unknown whether these were the result of predation or scavenging. There was evidence of gun shot on three tortoise remains. The only grazing Karl observed on the study plot was from wild horses and/or burros. Karl did not believe that the grazing was a factor.

Sheep Mountain Study Plot / Jean Lake Allotment:

This study plot (1 sq. mile) was first established in 1979 and resurveyed in 1984. The plot is located in the Jean Lake Allotment approximately three miles southeast of Jean at the base of Sheep Mountain (T24S, R60E, parts of Sections 31 and 32, and T25S, R60E, parts of Sections 5 and 6). Alice Karl surveyed the plot in 1979 for 30 field days. Russell Duncan and Todd Esque resurveyed the plot in 1984 for 60 field days.

Population estimates for the plot varied between Karl's estimate of 36 tortoises >180mm per square mile Karl, and Duncan and Esque's estimate of 47±14 tortoises per square mile Duncan and Esque. These estimates were similar. Sex ratio of adults(M:F) was near 1:1 for both surveys.

Though 40 tortoise remains were found in 1984, it was believed that many remains were missed during the 1979 survey. Eighteen of the 40 remains found in 1984 were believed to be at least four or more years old since death. Karl only surveyed the study plot 1.5

times. However, the remaining 22 remains located in 1984 were in the immature or younger age classes and appeared to have died within the prior one to two years.

Nineteen (86%) of the carcasses may have been preyed upon or scavenged by ravens. This may indicate a potential impact to the tortoise population from ravens in this area. This plot is near an area with increasing human activity associated with casinos at Sloan, Jean, and Stateline. (See Predation section on raven populations.)

In 1979, 10 of 32 tortoises found (including 1 juvenile, 1 immature) had sunken vertebral scutes. In 1984, five of 13 juvenile tortoises had sunken vertebral scutes. It is common for older tortoises in the adult II (>240mm) and adult I (208-240mm) size classes to exhibit scute concavity as they advance in age. However, such concavity in younger animals is not normal and indicates a history of nutrient deficiency.

The possible high incidence of raven predation on young animals, the indication of nutritional problems in all size classes (younger size classes in particular), may have a dramatic negative affect on population recruitment.

The plot is located on a site in good to excellent ecological condition with a an extremely high plant species diversity and good cover, and only slight livestock grazing use (usually after rains).

Christmas Tree Study Plot / Christmas Tree Pass Allotment:

This study plot was established in 1985 and is located within the Christmas Tree Pass Allotment in Piute Valley approximately one-half mile east of U.S. Highway 95 near Cal-Nev-Ari (T30S, R64E, S1/2 Sec. 29 and N1/2 Sec. 32). The plot was surveyed by Russell Duncan and Todd Esque for approximately 60 field days (Duncan and Esque, 1985).

The population estimate was 159±27 tortoises >140mm. The sex ratio was near 1:1. The only concern raised was the large number (actual numbers were not noted in their report) of young tortoise remains found, mostly off-site under power lines and fences, which showed signs of avian predation or scavenging. Duncan and Esque believed that such high mortalities of young animals could result in inadequate recruitment.
Slight to light grazing use occurs in the plot area and the ecological condition is good to excellent, with 15 to 20 percent vegetative cover.

Gold Butte Study Plot / Gold Butte Allotment:

This plot is located in the Gold Butte Allotment near the Arizona border approximately 40 miles south of Mesquite (T18S, R71E, Sec. 29). The plot was surveyed by Russell Duncan in 1986 for 60 field days (Duncan, 1986).

Duncan estimated the population to be 96±15 for tortoises >180mm, and 131±28 for all tortoises. Only 7 of 88 tortoises found were ≤180 mm. The sex ratio was near 1:1.

His conclusion regarding the status of the tortoise population in the Gold Butte study plot is best summed up in a note he sent to the BLM with his field notes which stated: "Something has happened to this population at Gold Butte for it to suffer low recruitment. This is not a very recent phenomenon. Most remains were due to natural causes in adult size and very few juvenile remains were found." (August 1986). Only seven tortoises ≤180mm were found out of a total of 88 tortoises located. Reasons for the lack of young animals are unknown.

The study plot was surveyed again in 1990. Only 32 tortoises were located during the 60 field day survey. The small number of animals located is probably the result of low tortoise activity during the spring of 1990 due to drought conditions. Of the 32 tortoises captured in 1990, 21 were originally marked in 1986. Only three tortoises <180mm were located in 1990, indicating low reproduction and potential recruitment for the Gold Butte area. The 1990 population estimate for all tortoises in 1990 was 54±15. However, when calculating the population estimate based upon the recapture in 1990 of animals marked in 1986, a population estimate of 132±16 was made. This estimate is similar to the 1986 population estimate and may reflect no significant change in the Gold Butte population between 1986 and 1990.

Ravens do not appear to be a problem in Gold Butte, though they occur in greater abundance along the Virgin River near Mesquite. Livestock use on the plot is slight and ecological condition is good.

Trout Canyon Study Plot / Wheeler Wash Allotment:

The Trout Canyon study plot was established in 1987 for baseline data as part of the NDOW/BLM tortoise relocation study. The plot was selected by wildlife biologists for the excellent production perennial and native annual plant species. Soils were not evaluated at that time. The plot was surveyed by BLM biologists, Brad Hardenbrook and Jeanie Cole, for 45 field days.

The plot is located approximately 12 miles southeast of Pahrump and 36 miles west of Las Vegas (T21S, R55E, on portions of Secs. 9, 10, 15, and 16). Tortoises were never relocated to this site (except for six tortoises moved to the site for a one week period then removed), but six radio-transmittered resident tortoises were located weekly between June and early November of 1988.

The population estimate for tortoises >180mm was 28±10. Twenty-four tortoises >180mm and seven tortoises ≤180 were found during the survey. Thirty-one tortoise remains were located for a crude mortality rate of 6.7%. Sex ratios were very near 1:1.

Seven (23%) of 31 live tortoises of various size classes had sunken vertebral scutes. Eight of 21 tortoise remains showed signs of bone thinning. Though no signs of avian predation was found, six shell remains had predator chew marks.

Cattle grazing has not occurred on the plot since the 1970s and was lightly used even then because of the management system and its distance to water. Wild horses use is slight during the winter. One tortoise burrow was collapsed by a wild horse. Though ecological range conditions are estimated to be good to excellent, with high perennial and annual plant species diversity, many tortoises (7 of 31 live tortoises and 8 of 21 tortoise remains) showed signs of nutrient deficiency.

Mormon Mesa Study Plot / Toquop Sheep Allotment:

This study plot was one of three surveyed in 1989 Sierra Delta Corp. and SWCA consultants. Kraig Kennedy and Dr. Scott Mills were the chief field investigators and supervised the four person crew. The plot is located on Mormon Mesa approximately 60 miles northeast of Las Vegas and 15 miles west of Mesquite. The plot was surveyed for 60 field days.

The population estimate was 64±23 for tortoises >180mm. Eighty tortoise remains were found, but only 22 could be classed to size. Five of the 22 tortoise remains were animals ≤180mm.
Crude mortality rates for tortoise ranged from 5-25%. The mortality rate was determined by comparing total remains representing a twenty year period to those remains representing deaths occurring in the previous four years. The sex ratio was 20:25, essentially, 1:1.

Of the 22 shell remains classed, two had signs of avian predation or scavenging and two had predator chew marks. Two tortoises had conditions symptomatic of URTD (Upper Respiratory Tract Disease) and 59% of all tortoises had sunken vertebral scutes across all size classes (65% of tortoises >180mm and 25% of tortoises ≤180mm). Though older tortoises regularly display shrinkage and concavity

in vertebral scutes, the wide distribution of such concavity in this population indicates that there is a serious nutritional problem occurring.

The study plot is within the Toquop Sheep Allotment where domestic sheep use the area from March through mid-May of each year. The area is in good ecological condition and use is slight to light.

Piute Valley Study Plot / Crescent Peak Allotment:

The Piute Valley study plot was established in 1979. It was surveyed in 1979 by Alice Karl, in 1983 by NDOW, in 1987 by Dave Germano (University of New Mexico), and in 1989 by the Sierra Delta Corporation and SWCA consultants. The plot is located approximately three miles west of Cal-Nev-Ari and U.S. Highway 95 and 12 miles south of Searchlight. The plot was surveyed in 1979 for 30 field days, and in 1983 and 1989, for 60 field days. In 1987, the plot was only surveyed 1.5 times, and the population estimate was based upon data collected for one half of the plot.

The number of tortoises (>180mm) found varied from 50 animals in 1979 to 29 in 1983 and 1987, and 30 in 1989. Tortoises ≤180mm on the plot varied between 34 in 1979, 19 in 1987, and 16 in 1989. The problem with comparing population estimates between years was the use of different methods by investigators. However, there appears to be a change in population structure.

Between 1979 and 1983, more than 109 tortoise remains were located. Most of these mortalities were believed to have occurred on or about 1981. No causative factors for the mortality were determined. Though the number of tortoises >180mm decreased from 50 found in 1979 to 29 in 1983, this size class has remained fairly stable since 1983.

Though there was an initial die-off of older animals in the age class (≥ 180 mm), recruitment of younger-aged adults (≥ 180 mm) did occur (34 in 1979, 52 in 1983). However, the number of tortoises in this size class decreased to 19 in 1987 and 16 in 1989. Several factors confound the comparison of population estimates between years. The survey method used in 1987 was the least intensive of the four surveys. Young (i.e., small) tortoises are difficult to find and are frequently overlooked, especially during shorter survey periods. It is probable that many younger-aged tortoises were not observed in 1979. 1989 was a drought year and tortoise activity, hence the probability of observing them, was reduced. Many variables influence the observation of small-sized tortoises to put too much emphasis on specific numbers. However, there appears to be a trend since 1979.

Since 1983, (after the large die-off), 70 tortoise remains have been found on the study plot. A crude mortality rate was calculated as 12-29% for tortoises >180mm and 17-41 percent for all tortoises on the plot. Of 33 remains found in 1989 that could be evaluated, two showed signs of avian predation or scavenging and eight had predator chew marks.

While specifically looked for, no signs of URTD were observed during the 1989 survey. The possibility of disease should be investigated.

The study plot is located in the Crescent Peak Allotment and has received slight to light cattle use in the winter and/or spring during the past ten to fifteen years with alternating periods of rest. Range conditions dramatically improved after a deferred grazing system was established in 1976. The ecological condition has had a static to upward trend. Climatic conditions have been above average from about 1978 to 1985.

Coyote Springs Study Plot / Delamar Allotment:

The plot was established in the spring of 1986 in Coyote Springs Valley along the old and now abandoned highway that was replaced by U.S. Highway 93. The plot is approximately 45 miles north of the junction of Highway 93 and I-15 and 14 miles south-southeast of the Pahranagat Wildlife Refuge (T. 11 S., R. 63 E., parts of Secs. 4 and 5). The plot was surveyed for 60 field days by Duncan and Esque in 1986.

The population estimate was 49±4 for tortoises >180mm and 96±6 for all tortoises. This is the only plot in Nevada where the sex ratio was skewered toward females (14:29)

Of 36 tortoise remains found, none showed signs of avian predation or scavenging, one juvenile or carcass was taken by a kit fox, and eight remains had predator chew marks. There was not good forage production during 1986, which may have influenced tortoise activity and affected the population estimate. Overall, this population appears to be in the best condition of any known in Nevada.

This plot is located in the Delamar Allotment but grazing had not occurred on the plot for at least ten years prior to the survey.

Sand Hollow Study Plot / Sand Hollow Allotment:

The Sand Hollow study plot is located in the Sand Hollow Allotment approximately twelve miles due north of Mesquite. This plot was surveyed in 1989 by SWCA consultants for 60 field days.

Similar to the Last Chance study plot, the Sand Hollow study plot is located in very low density tortoise habitat. This tortoise population is contiguous to the Beaver Dam Slope tortoise population of Utah and Arizona. Only seven tortoises were found during the survey. Five tortoises were >180mm. Because of the small number of tortoises found, and the lack of recaptures, population estimates for this site are questionable. However, based upon the information gathered, the population estimate is 8±10 for tortoises >180mm and 16±14 for all size class tortoises. The crude mortality rate ranged from 6.5% to 16%. The sex ratio was 2:3. One adult female had sunken vertebral scutes.

The population estimate is consistent with the 1.5 mile triangular transects conducted in the area which indicated tortoise numbers to be 0-20 per square mile. This plot is located between two livestock waters (one <1/2 mile away and the other <1/4 mile away) and the forage receives moderate to heavy utilization. Cattle grazing historically occurred on or near the plot between mid October and May 31 of each year.

IV. IMPACTS OF THE PROPOSED ACTION

Desert Tortoise Nutrition

Like all herbivores, desert tortoises are very dependent upon the nutritional quality and quantity of available forage to meet self-maintenance and reproductive needs. Medica et al. (1975) found a correlation between winter rains and tortoise growth rates. However, such growth rates are age and sex dependent: younger animals experience higher growth rates and males continue to grow at a faster rate than females once sexual maturity is reached (Weinstein and Berry, 1988). Nagy and Medica (1986) stated that, "Challenges to the survival and reproduction of tortoises living in deserts include very high and low ambient temperature, periodic shortages of water and succulent food for maintaining water and energy balance, and potentially high dietary salt loads". The authors found that in spring, tortoises gained weight by eating succulent annual plants, but "energy intake was less than required to meet energy expenses...". Tortoises later achieved positive energy flux while eating dried plants but body mass declined due to negative water flux. This cycle was repeated after summer rains in response to plant green-up followed by plant curing. The desert tortoise appears to be in a continual imbalance during any given period during the year, but is able to maintain homeostasis on an annual basis. Tortoises are in a physiologically stressed and moderately dehydrated state during spring emergence. The consumption of green annuals and free water helps to flush the bladder of high concentrations of salts which will later enable the tortoise to consume dry forage high in protein. However, metabolism of dry forage again causes a build up of salts in the

bladder, without fresh water supplies to flush the system, which affects the ability of tortoises to intake dry forage. Summer rains and subsequent green-up allows the tortoise to again flush the bladder of concentrated salts which allows the intake of higher energy foods. The longer "green" succulent forage is available, the less physiological stress tortoises could experience. Less fluctuations in bladder osmotic concentrations would enable tortoises to consume foods with a higher protein content for a longer period of time. This would allow a greater potential of success for self-maintenance and reproduction. Hence, the availability of perennial grasses which maintain moisture over a longer period of time, could be very important for physiological maintenance and reproduction.

Sunken scutes are believed to be the result of thinning of the carapace bone which results in structural weakness and consequent sinking of the scutes (Jarchow, 1987). Sunken scutes are an indication of osteoporosis which results from a diminished organic bone matrix. This may be the result of "aging and associated diminished protein anabolism" and malnutrition that may affect the formation of the protein matrix for bone formation. In comparisons of known-aged tortoises with shell-wear and growth characteristics, Berry and Woodman (1984) found that there was a correlation between older animals and higher shell-wear classes (there are seven shell-ware classes). In general, shell-wear classes correspond closely with the following; tortoises in shell-wear Class 1 are hatchlings or very small juveniles <60mm CL (carapace length); Classes 2 and 3 tortoises are generally juvenile, immature, or subadults; Class 4 tortoises are young adults; Class 5 tortoises are middle-age adults; and Class 6 and 7 tortoises are aged animals. A wide range of sizes (and presumably age) in shell-wear classes 2, 3, and 4 was common and thought to be due to variations in growth rates. Berry and Woodman (1984) also found 46% of tortoises in Class 6 (n=148) and 50% of those in Class 7 (n=21) to show no or negative growth, respectively. Tortoises in these two shell-wear classes may have been experiencing shrinkage due to changes in bone structure.

Due to normal physiological patterns associated with advancing age, sunken scutes are relatively common in shell-wear classes 6 and 7, whereas sunken scutes in lower shell-wear classes provide indications of abnormal growth or less-than-adequate nutrition. Jarchow (1987) believed that the availability of dietary calcium is reduced by low protein intake and that bone demineralization may result, thus demonstrating symptomatic osteoporosis conditions. This would then explain the presence of sunken scutes in lower aged or shell-wear classes. Jarchow believed that sunken scutes in younger aged animals in shell-wear classes 1 through 5 on the Beaver Dam Slope represented malnutrition and that mid-to-late summer nutrition was as important as spring nutrition.

Tortoises found on the Sheep Mountain tortoise study plot in 1979 with sunken scutes were in shell-wear classes and size (age) classes similar to those found by Berry and Woodman (1984) in California. Immature I tortoises (101-140mm MCL) had shell-wear classes of 2 or 3, subadults (181-207mm MCL) had shell-wear classes of 3 or 4, and adults I and II were in the shell-wear classes 6 and 7. However, the latter is indicative of older aged animals within the size class. Adult tortoises found on the Trout Canyon study plot were generally in a lower shell-wear class than those found on the Sheep Mountain plot. This indicated that overall, animals on the Sheep Mountain plot are generally older than those at Trout Canyon. However, in both plots, those tortoises displaying sunken scutes were within the shell-wear classes expected for their size. Evidence of possible malnutrition based upon the occurrence of sunken scutes in younger aged animals occurs in at least some areas of southern Nevada. Table 6 summerizes evidence of sunken scutes in southern Nevada.

Table 6.
Live Tortoises With Sunken Scutes
Found on Tortoise Study Plots

Plot Name	Year	Tortoises with Sunken Scutes/ Total Tortoises Found	Tortoises ≤180mm with Sunken Scutes/ Tortoises ≤180 Found	Remarks
Last Chance	1979	--	--	Not Identified
Sheep Mtn	1979	15/32	3/10	Most of the adults with sunken scutes appeared to be very old-aged animals
Sheep Mtn	1984	Unknown	5/13	No mention made of sunken scutes occurring in animals >180mm
Xmas Tree	1985	--	--	Not Identified report
Gold Butte	1986	Unknown	Unknown	Data cards or report was never furnished by the contractor.
Trout Canyon	1987	7/31	1/7	8 of 21 shell remains also showed signs of bone thinning
Mormon Mesa	1989	32/54	2/8	Very high percentage of tortoises with sunken scutes and other abnormalities.
Piute Valley	1979	--	--	Not Identified
"	1983	--	--	"
"	1987	--	--	"
"	1989	2/46	None	Only one adult and one subadult found with sunken scutes

Because older aged tortoises experience osteoporosis as a part of the aging process, tortoises with sunken scutes should occur in all tortoise populations. Of significance in Nevada is the occurrence of some younger aged tortoises with sunken scutes and very probably, osteoporosis. Tortoises ≤180mm MCL with sunken scutes have been found at three of the nine study plots in Nevada. These study plots are Sheep Mountain, Trout Canyon, and Mormon Mesa. At Sheep Mountain, three of ten tortoises ≤180mm MCL had sunken scutes in 1979 and five of thirteen tortoises ≤180mm MCL had

sunken scutes in 1984. One of seven and two of eight tortoises ≤180mm MCL had sunken scutes at the Trout Canyon and Mormon Mesa study plots respectively. In addition, 65% of tortoises >180mm MCL at Mormon Mesa had sunken scutes. Either the Mormon Mesa population is made up of relatively old aged animals or severe nutritional problems are occurring.

As discussed earlier, deficiencies in nutrition are believed to be a causative factor in premature osteoporosis. Whether this is the result of mineral deficiencies in the soil or lack of protein availability in forage plants is unknown. Jarchow (1987) noted that the local livestock operator on the Beaver Dam Slope indicated that calves required phosphorous supplementation. Jarchow dismissed phosphorus deficiency as a probable problem because plasma phosphorus levels in live tortoises he examined were believed to be normal to mildly elevated and calcium:phosphorus ratios of osteoporotic bone samples were reduced. Two tortoises with osteoporosis had reduced plasma vitamin A levels which he believed to reflect inadequate nutrition. As described earlier, Nagy and Medica (1986) found that tortoises appear to be at an osmotic imbalance at any given time. When green annuals or free water is readily available, tortoises essentially flush out or dilute the built-up concentration of salts stored in the urinary bladder. This physiologically enables tortoises to consume drier more nutritious plants after the green annuals have cured. However, during the green annual growth, tortoises are at a negative energy balance. This is changed once the bladder urine is diluted and tortoises can consume drier forage plants. One way of softening the extremes in osmotic imbalances is to have a greater variety of annuals and perennial grasses available. Different annuals and perennial grass species green up at different times. This would provide more succulent forage species over a greater period of time which will help to keep the water balance in a favorable condition and therefore provide opportunity for a longer period of positive energy balance.

Perennial grass species such as Indian ricegrass, bush muhly, sand dropseed, and black grama have largely been replaced by shrub species or more grazing-tolerant grasses like big galleta. Waser and Price (1981) found that annual plant species diversity in the Sonoran Desert declined with livestock grazing. Native annuals such as Amsinckia sp., Plantago sp., Phacelia sp., Pectocarya linearis, Caulanthus sp., and Malacothrix sp. have in some cases been replaced by red brome (Bromus rubens), Erodium cicutarium, Schismus barbatus and other introduced annuals. A reduction in species diversity fosters more predominate boom-bust cycles in the vegetation. This in turn fosters more extreme physiological imbalances in tortoises which may affect overall nutritional condition. There are potential effects on the vegetative community from livestock grazing, particularly continuous spring and summer grazing. The direct affects of grazing on tortoises have not been

documented, though forage competition is assumed to occur. It is well known that tortoises often consume the succulent portions of plants such as leaves and flowering parts (Hansen et al, 1976). Because livestock consume the terminal parts of forage plants during the course of grazing, the availability of more succulent leafy material and flowering parts could be expected to be reduced. How this may affect tortoises foraging behavior or tortoise ability to maximize the obtainment of more nutritious forage is unknown. Dr. Ron Marlow (pers. comm. 1990) reported that tortoises on his research plot in California drastically reduced their above ground activity upon the arrival of domestic sheep in early spring. Even after the sheep were moved, tortoise activity continued to be greatly reduced for the remainder of the season.

Implementation of grazing prescription 1 is expected over time to enhance the quality of desert tortoise habitat on approximately 1,753,000 acres of desert tortoise habitat on BLM lands in Nevada. These lands include virtually all of BLM's Category 1, 2, and 3 desert tortoise habitat areas. This will be accomplished by increasing desirable plant species diversity, composition and ground cover. Overtime ecological condition should reach or approach PNC (potential natural community). This in conjunction with the spring reservation of forage as prescribed in grazing prescription 1 should provide for the nutritional needs of desert tortoises. However, depending upon range site, it may take years to decades to see a maximum response of the vegetative community. Consequently, the time-lines in which the population objectives are realized are unpredictable. Without competition from livestock during the spring growing period, more plants and plant parts (i.e. flowers) will be available to the desert tortoise during their most active period thus maximizing the benefit of the forage reservation. With an increase in plant species diversity and abundance tortoises will have a greater probability of being more selective in choosing those plant species or plant parts more nutritious, thus improving the chances of them meeting their nutritional requirements. With an increase in tortoise nutritional needs being satisfied, tortoises should be more fit which should be reflected in healthier and more vigorous tortoise populations. Over the long-term it is expected that adult tortoise mortality should be reduced to an average of less than 2% annual crude mortality, incidence of osteoporosis should decline to acceptable levels, clutch size should be increased, and tortoise populations should reflect an expected normal age structure of approximately 40% adults and 60% immatures and juveniles with an average annual recruitment of 3-5%.

Livestock grazing during the summer and early fall period allowed under prescription 1 will have a less beneficial affect on desert tortoises. However, the reservation of forage during the critical spring period and the utilization limits during the summer and early fall period should more than compensate for the potential

competition of livestock grazing during this period. Since most perennial grass species including both cool and warm season species and native annuals achieve their greatest growth and phenological progression before mid-June in the Mohave Desert, rest from livestock grazing during this period will allow the most benefit to plant vigor, growth, and production. Most perennial grass species production after summer rains is limited to vegetative growth with few plants reaching seed set. Therefore livestock grazing will have a lessor impact on the potential enhancement of the vegetative community during this period.

Improvements in the vegetative communities and desert tortoise populations resulting from implementation of grazing prescription 1 should be reflected in all the currently existing desert tortoise study plots, except for the Last Chance study plot, over the next 10 to 20 years.

Implementation of grazing prescription 2 will maintain existing vegetative communities on approximately 1,040,000 acres of BLM lands comprising mostly Category III desert tortoise habitat. By limiting maximum utilization levels at 40% of annual growth (light use) of key forage plant species, vegetative plant communities should be maintained at least at current condition with some potential improvement. Desert tortoise populations are expected to be maintained at current levels with little improvement in the health and vigor of individual tortoises.

Upper Respiratory Tract Disease:

Improvements in the vegetative communities within categorized desert tortoise habitat areas as described under "Nutrition" above will help tortoises to meet their nutritional needs. This has the potential to help tortoises withstand the affects of the Upper Respiratory Tract Disease. Under prescription 2, there is less potential for tortoise nutritional enhancement and consequently the benefits will not be as great.

The disease known as Upper Respiratory Tract Disease (URTD) has recently been documented in various locations throughout the range of the desert tortoise (Berry and Slone, 1989). It is not completely understood what specific pathogens and health factors are responsible for causing the condition though a mycoplasma bacteria has recently been isolated that may be one of several pathogens of URTD (Berry, pers. comm. 1989). The disease is believed to be chronic and persistent. Dr. Jacobson (1989) has documented chronic symptoms of URTD which include: 1) nasal exudate, bubbles, or crusts of dried mucous on nares, crust of dried mucous on forelegs; 2) sunken eyes; 3) weight loss; 4) dull integument; and 5) lethargic appearance with legs hanging loose.

These symptoms were described for the chronic stage of the disease (Jacobson, 1989).

Upper Respiratory Tract Disease has been known to occur in captive desert tortoises for years (pers. comm. Berry, 1989) but has only recently been documented in the wild. Information concerning the incidence of URTD rangewide was provided at the URTD workshop sponsored by the BLM on October 12 and 13, 1989 at Riverside, California and Las Vegas, Nevada. The first evidence of what now is referred to as URTD occurred in 1988 at the Desert Tortoise Natural Area in California. At that time a BLM contractor (Dr. Craig Knowles) noted that 8% of 168 tortoises observed had symptoms indicative of URTD. In 1989, Knowles surveyed tortoises in the Desert Tortoise Natural Area, Rand Mountains, and Fremont Valley under a BLM contract. He found that 43% of 468 tortoises had URTD symptoms and that 20% of the 168 tortoises observed in 1988 were dead. Tim Duck and John Payne of BLM reported that in 1986, 8 of 20 tortoises on the Beaver Dam Slope showed symptoms of URTD and in 1989 another three of five tortoises found south of the Beaver Dam Slope had the symptoms. They also reported that as early as 1977, Eric Coombs had reported the occurrence of URTD symptoms for tortoises on the Beaver Dam Slope. Dr. Cecil Schwalbe also reported that 10 of 59 tortoises on the Arizona portion of the Beaver Dam Slope had URTD symptoms. In addition, at least seven of 53 tortoises at three sites in southeastern Arizona had URTD symptoms - this does not include tortoises at the Saguaro National Monument East which have also been documented to have individuals with the symptoms.

Until 1990 only six tortoises had been documented to have symptoms of the disease in Nevada. Two potential cases occurred at the Mormon Mesa study plot, and another two tortoises with the symptoms were found near the Apex Industrial Park. One tortoise with the symptoms was discovered on Summerlin lands west of Las Vegas, and one tortoise with the symptoms occurred in Rock Valley on the Nevada Test Site. However, in early 1990 another possible suspect was found at the Gold Butte tortoise study plot. The severity of URTD occurrence in Nevada was discovered during the summer of 1990 with the collection of tortoises in Las Vegas Valley for use in a desert tortoise research program. Of 829 tortoises collected, 120 were symptomatic of URTD. The presence of URTD in these individuals was confirmed by Dr. Elliot Jacobson through laboratory analysis. However, the distribution of URTD in the Valley appeared to be concentrated and localized along the western fringe of Las Vegas. To date, the occurrence of URTD in wild populations in Nevada outside of Las Vegas Valley still appears to be rather uncommon.

During the URTD Workshop in 1989, Dr. Jacobson (professor of veterinarian medicine at the University of Florida) and Col. George Lewis (veterinarian scientist and assistant to the Surgeon General

at the Pentagon) both stated that diseases similar to URTD are often nutritionally dependent and that they appear during times when immune systems are weakened due to nutritional deficiencies.

More research is needed before the causative factors and pathogens can be positively identified.

Predation

If the vegetative objectives are met through implementation of the grazing prescriptions, the increase in ground cover and vegetative structure is expected to provide improved cover for desert tortoises. This will not only improve the ability of desert tortoises to control their body temperature through thermal regulation but also will improve the ability of juvenile tortoises to hide from predators and thus increase their probability of survival.

Predation is a natural occurrence in all wild animal populations. However, the importance of predation as a mortality factor on tortoise populations is not well understood. Predation by coyotes, kit fox, ravens and other avian species, badgers and bobcats are believed to occur at least casually. Coyote predation on tortoises has been documented by Berry (1974). In most cases, it is very difficult to document whether a carcass was the result of predation mortality or had just been scavenged on. Both live tortoises and tortoise carcasses sometimes have chew marks along the marginal scutes. In any case, predation should have little long-term affect on healthy vigorous, natural populations of long-lived prey species. However, long-term reductions in abundance of primary prey species (i.e. rodents and lagomorphs) due to ecological changes in the environment, may cause predators to switch to other secondary prey species. In addition, artificially high predator populations resulting from human activities may cause a corresponding increase in predation of prey species beyond that which the prey population can readily withstand.

The following table documents evidence for predation or scavenging on tortoises at study plots in Nevada.

Table 7
Indications of Predation Or
Scavenging On Nine Desert Tortoise
Study Plots in Nevada

Study Plot Name	Year	Predation Sign
Last Chance	1979	Ten of 53 tortoise remains had predator chew marks.
Sheep Mountain	1979	Two of seven tortoise remains had predator chew marks.
Sheep Mountain	1984	Nineteen (19) of twenty-two (22) tortoise remains ≤180mm MCL were preyed or scavenged on by ravens.
Xmas Tree Pass	1985	Though the number of tortoise remains are not available, the contractor noted that there was avian predation on young (presumably tortoises ≤180mm MCL) tortoises. These remains were found off the study plot under near by powerlines and fences.
Gold Butte	1986	No information was provided on mortality or tortoise remains.
Trout Canyon	1987	No avian predation was noted. Six of 31 tortoise remains had predator chew marks.
Mormon Mesa	1989	Two shell remains had avian predation sign and two remains had predator chew marks.
Piute Valley	1979	None identified.
Piute Valley	1983	16 tortoise remains had predator chew marks. Two of these were partially eaten, they were missing limbs and exhibited chew marks. The remainder of the carcasses displaying chew marks were subadults and adults. It was not known whether the animals were predated or scavenged. Three active raven nests, one golden eagle nest, and one red-tailed hawk nest were inspected for tortoise remains below the nests - none were found.
Piute Valley	1987	Five or six tortoise remains had predator chew marks. Avian predation was not documented.
Piute Valley	1989	Two tortoise remains showed signs of avian predation and eight had predator chew marks.

Of 412 remains documented in the above study plots, 58 (14%) had predator chew marks. It is probable that the two remains found on the Paiute Valley study plot in 1983 were predation kills. Twenty three possible raven kills were documented (this does not include those found off the Xmas Tree study plot) in the same plots. Remains of tortoises associated with raven kills are almost always of juvenile tortoises (<101mm MCL), though ravens have been documented to have killed adult tortoises in California (BLM, 1989). One reason is that complete shell ossification does not occur until tortoises are approximately 100mm MCL in size. Tortoise carapaces that are not yet completely ossified are more vulnerable to shell penetration.

Predation by ravens appear to have the greatest affect on desert tortoise populations due to local intensity of the predation, which likely affects long-term recruitment in localized areas. The predator-prey relationship between ravens and tortoises is not now a natural one. Raven populations have increased 15-fold in some areas of California and doubled in some areas of Nevada in the past 20 years (BLM, 1989). The extent of raven predation on desert tortoises is well documented in the California BLM's environmental assessment for the "Selected Control of the Common Raven to Reduce Desert Tortoise Predation in the Mojave Desert, California" (1989). In very localized areas around Searchlight and Ivanpah Valley in Nevada, raven populations appear to have greatly increased in recent years. Raven population increases are directly related to human activities including the expansion of urban areas, agricultural developments, roads, transmission and power lines, sewage ponds, and open landfills all of which provide food, perches, and nest sites.

A combination of artificially high raven populations combined with reduced foliage cover and structure due to livestock grazing will almost undoubtedly result in higher predation of juvenile tortoises than would occur naturally. Whether tortoise populations experiencing such high mortality rates among young cohorts over long periods of time can sustain such predation is doubtful.

Desert Tortoise Mortality Rates

It is expected that an increase in desirable plant species composition, diversity, ground cover and structure as anticipated under grazing prescription 1 will result in reduced tortoise mortality within most categorized desert tortoise habitat (approximately 1,753,000 acres). This should be reflected in desert tortoise study plots over the next 10 to 20 years. The benefits derived from implementation of grazing prescription 2 should be less pronounced and will probably result in a continuation of existing mortality rates.

Crude mortality rates for Nevada are extremely variable. In some cases, crude mortality rates were computed for tortoises of all age classes and in others for subadult and adults only. It is difficult to compare mortality rates between different study plots and sometimes within the same study plot over time. Difficulties in computing crude mortality rates include: widely variant population estimates; aging the time of death for tortoise remains; the potential for overlooking tortoise remains; the removal or addition of tortoise remains via predators; the variability of tortoise mortalities between different years (i.e. normal year vs drought years) which may not reflect long-term mortality rates; portions of a remain that are found, different decomposition among

age classes; uncounted mortalities which may occur underground; and the tendency for avian predators to carry carcasses to nest or perching sites. Two computations were made for the Mormon Mesa study plot, one for those remains believed to be less than four years old and another for all remains based upon a 20 year period. This resulted in mortality rates of 5% to 25% for Mormon Mesa with the lower rates computed for mortality over the previous four years. Because all of the shell remains were not size-classed (only 22 of 80 mortalities were size-classed on the Mormon Mesa plot) in all of the plots it is impossible to compare adult mortality rates with juvenile and immature tortoise rates on many study plots. Of course none of the crude mortality rates include animals that may have died underground. In any case, some of the crude mortality rates appear fairly high and should be of concern. This particularly applies to the Piute Valley study plot where a 24% mortality of subadult and adult animals occurred on or around 1981 and a relatively high mortality of younger aged animals appears to be occurring. Other study plots that appear to have relatively high crude mortality rates include Mormon Mesa, Sheep Mountain, and Trout Canyon. As additional data is collected and better evaluation of tortoise remains are made, mortality data should be fined tuned to provide better analysis.

Livestock Trampling

The proposed grazing prescriptions are not expected to significantly reduce the potential for livestock trampling when livestock are present. Livestock trampling impacts around or near livestock concentration areas such as livestock waters and salt areas will continue when livestock are present. However, livestock trampling potential will be significantly reduced in Category I, II, and III areas with the elimination of livestock from March 1 to June 14 each year. New projects that would tend to cause a concentration of livestock in relatively undisturbed habitat would create additional trampling impacts. However, no new projects are proposed as part of this proposed action. Livestock trampling potential associated with domestic sheep grazing would be significantly reduced with the removal of sheep from March 1 to June 14 each year. The magnitude of the impact from domestic sheep grazing is unknown. However, it is more likely that trampling of burrows would occur around the sheep herders camp, lambing grounds, and bedding sites. It is probable that some trampling of burrows will occur annually as a result of livestock grazing in general but is impossible to quantify. It is less probable that tortoises above ground would be trampled but trampling could occur. Assuming livestock use periods will be reduced by 25% in Category I, II, and III areas, it can be expected that a similar reduction in trampling would also occur.

Though ungulates will usually avoid stepping in holes or on large objects such as rocks and large tortoises, it is well documented that ungulates damage or destroy tortoise burrows when they inadvertently step on the roof of a burrow causing the burrow to collapse. A tortoise burrow was collapsed by a wild horse in 1987 on the Trout Canyon desert tortoise study plot. Nicholson and Humphreys (1981) found that 10% and 4% of 164 tortoise burrows in California were damaged or destroyed respectively after approximately 1000 sheep grazed the area intermittently for 12 days in May of 1980. During the same period, a juvenile tortoise was buried in its burrow after the burrow was trampled by sheep. Marlow found a similar incident in the 1970s (pers. comm. 1990). Tim Duck (pers. comm. 1990) indicated that a tortoise was trampled by livestock near a watering trough on the Arizona portion of the Beaver Dam Slope. Mike Coffeen of the Utah Division of Wildlife Resources found one of his radio transmittered adult female tortoise buried six inches in the base of its burrow after a cow had stepped on the roof of the burrow. The tortoise was packed in the moist soil so tight that it could not extend or move its limbs. Coffeen believed that the tortoise would have died if he had not dug it out. He also believed that the tortoise would have been fatally injured had the ground not been moist enough to provide a cushion (pers. comm. 1990).

The significance of direct impact to tortoises as a result of both tortoise and burrow trampling by livestock is unknown. Undoubted ly it occurs, but the frequency and extent is not well documented. It does appear however, that impacts from domestic sheep trampling are more significant than from cattle. This is due primarily to the difference in herding behavior between the two. Sheep generally herd (and sometimes are herded) in fairly tight groups and consequently impact more surface area of the ground. Except around water troughs or shade areas, cattle in the Mojave Desert generally break into small groups of five or six animals and cover a relatively large area. Because of the low density of cattle use in most of the Mojave Desert, it is doubtful that significant trampling occurs of tortoise or tortoise burrows in most of the grazing allotments. As stated earlier, the likelihood of trampling increases around cattle concentration areas such as waters or shade, or may be increased under intensive management where high intensity short duration grazing practices are implemented.

V. MITIGATION MEASURES

Mitigation measures are incorporated as part of the proposed action which is to implement the terms and conditions as described under the Proposed Action. If implemented, these terms and conditions will result in the improvement of desert tortoise habitat over time on approximately 1,798,000 acres of public lands and at least maintain existing habitat conditions on approximately 1,376,000

acres of those lands allotted for livestock grazing. Desert tortoise populations are expected to make a gradual improvement in virtually all Category I and II habitat areas and those Category III habitat areas managed under prescription 1. Desert tortoise populations within unallotted areas are expected to remain stable and those falling under grazing prescription 2 are expected to remain stable or continue to experience a downward trend.

Implementation of grazing prescription 1 as identified in the proposed action will result in at least a 29% reduction of incidental take on approximately 1,294,000 acres of currently active grazing allotments within Category I, II, and parts of Category III habitat areas because potential livestock trampling will be reduced. This is because livestock will be on these tortoise habitat areas 29% less time than now occurs. Because the extent of incidental take due to trampling can not be quantified, it is impossible to make a projection of the actual number of tortoises that may still be incidentally taken as a result of livestock grazing during other parts of the year.

By resting approximately 1,294,000 acres of currently grazed desert tortoise habitat during the spring growing period, an increase in percent composition of native perennial grasses is expected. This will result in increased cover and provide tortoises with an improved forage base. The improved forage base will result from both increased forage plant availability and provide tortoises with those plant parts most desireable. As the plant communities approach the upper level of their potential towards reverting towards natural conditions, plant species diversity and total forage production is expected to be increased for desireable plant species, particularly for perennial grass species. These conditions will result in improved nutritional condition of tortoises which will result in reduced mortalities and improved fecundity. Increased vegetative cover will result in reduced mortalities of tortoises particularly of hatchling and juvenile tortoises. Therefore, a progression of vegetative communities towards natural conditions with a resultant increase in ground cover and species diversity will directly affect tortoise survivability and well being and consequently result in reduced incidental take of tortoises that would normally occur under spring grazing by livestock.

Utilization levels not exceeding 40% on desireable plant species on approximately 710,000 acres of Category III tortoise habitat that is currently grazed during all or part of the spring growing period will have some benefit to the desert tortoise. This benefit will result from a potential increase in availability of forage for desert tortoises. Because of grazing pressure on seedlings, particularly of perennial grass species, and the increased stress on plant vigor due to livestock grazing during the growing season,

the potential for plant communities to revert towards their natural condition is much less than that for grazing prescription 1.

Included as part of the proposed action is to continue to implement vegetative and tortoise monitoring studies. Vegetative monitoring studies will include trend studies, utilization studies, and use pattern mapping in key areas within each active allotment. Where studies do not now exist, new studies will be established. BLM, FWS, and the Nevada Department of Wildlife (NDOW) will consult and coordinate the location and number of additional desert tortoise study plots to be established.

Monitoring studies to determine the affects of sheep trampling on desert tortoises should be established in domestic sheep allotments. The design of this study will be developed in consultation with FWS and NDOW.

An annual report shall be submitted to the FWS by December 15 of each year which will include a summary of the implementation of the grazing program for the previous fiscal year (i.e. number of allotments grazed, class, kind, and number of livestock licensed in each allotment, etc.) and a summary of the results of the range and desert tortoise monitoring data collected the previous fiscal year.

VI. INCIDENTAL TAKE

Though incidental take is very difficult to quantify, there is circumstantial evidence that both direct and indirect incidental take results from livestock grazing. Direct incidental take can be attributed to the accidental trampling of burrows with tortoises in them by livestock. It is also probable that juvenile or hatchling tortoises may be trampled on relatively rare occasions. Indirect incidental take is even more difficult to quantify than direct incidental take because it is more subtle. Reduced species diversity, ground cover, and forage availability in vegetative communities may result in higher predation of immature tortoises and reduce the health and nutrition of individual tortoises which may result in lower fecundity and higher mortality rates in tortoise populations.

Some incidental take is expected as a result of the livestock grazing program. However, it is impossible at this time to make a realistic estimate of what that take might be. Potential for incidental take is greater in the Toquop Sheep, Beacon, and Beacon duel use area (Gourd Spring allotment) where domestic sheep use is authorized. Sheep lambing and bedding grounds are expected to result in the highest incidence of incidental take.

Due to expected improvement in range condition and a 29% reduction in the livestock use period on approximately 1,249,000 acres as a result of the proposed action (grazing prescription 1), incidental take is expected to be significantly reduced, especially over the longer term. The 29% reduction in the livestock use period in many of the allotments will result in a probable 29% reduction of incidental take. Improvement in range conditions will result in a reduction of indirect incidental take over a period of time which is expected to take up to several decades to show a significant reduction.

Incidental take under the proposed grazing prescription 2 is not expected to be significantly changed from the existing situation. However, gradual improvement in range conditions resulting from a 40% limit on utilization levels during the spring growing period is expected to reduce downward trends of tortoise populations or maintain tortoise populations at existing levels depending upon localized range and habitat conditions and existing tortoise population vigor.

VII. INTERRELATED AND INTERDEPENDENT EFFECTS

Interrelated and interdependent effects of the proposed action include activities associated with typical livestock grazing operations. These may include such activities as vehicular trips by the operator to and from their allotment, to rounding up and transporting livestock, and maintaining water developments and fences. New range improvement projects are not anticipated as the direct result of the proposed action. Any future proposed projects will require Section 7 consultation before they can be constructed. Impacts associated with the interrelated and interdependent activities of the proposed action are not expected to be significantly different than what currently occurs.

Bibliography

Berry, K. H. 1974. Desert tortoise relocation project: status report for 1972. Div. of Highways, Calif., Contr. F-9353, Sect. III, C.3. 104pp.

-----, and S. Slone. 1989. Final notes from meetings on upper respiratory disease syndrome in desert tortoises. U.S. Bureau of Land Management, 12 October 1989 in Riverside and 13 October 1989 in Las Vegas. 20+pp.

-----, -----, C. Schwalbe, M. Coffeen, A. P. Woodman, B. Hardenbrook, and T. Shields. 1990. A summary of data on distribution and frequency of tortoises with signs of upper respiratory disease syndrome. Paper presented at Desert Tortoise Council Symp., 30 March-2 April, Victorville, Calif.

-----, and A. P. Woodman. 1984. Preliminary investigations of shell wear in determining adult age groups in desert tortoises. Pages 625-678 in K. H. Berry, ed. The Status of the Desert Tortoise (*Gopherus agassizii*) in the United States. Rept. to U.S. Fish and Wildlife Service, PO No. 11310-0083-81. Desert Tortoise Council, Long Beach. 838+pp.

Duncan, R. B., and T. C. Esque. 1986. Preliminary observations on the population density and structure of the desert tortoise at the Christmas Tree study plot, Clark County, Nevada, U.S.A. Unpubl. Rept., Nevada Dept. of Wildlife, Contr. No. 85-46. 16+pp.

Esque, T. C. 1986. A preliminary investigation of the population dynamics and ecology of the desert tortoise (*Xerobates agassizii*) at the Coyote Springs permanent study plot at Lincoln County, Nevada. Unpubl. Rept., Nevada Dept. of Wildlife, Contr. No. 86-63. 48pp.

-----, and R. B. Duncan. 1985. A population study of the desert tortoise (*Gopherus agassizii*) at the Sheep Mountain study plot in Nevada. Pages 47-67 in M. W. Trotter, ed. Proc. 1985 Symp. Desert Tortoise Council. Long Beach. 109pp.

Germano, D. J., and M. A. Joyner. 1989. Changes in a desert tortoise (*Gopherus agassizii*) population after a period of high mortality. Pages 190-198 in R. C. Szaro, K. E. Severson, and D. R. Patton, eds. Management of Amphibians, Reptiles, and Small Mammals in North America. U.S.D.A. Forest Service, Gen. Tech. Rept. RM-166.

Hansen, R. M., M. K. Johnson, and T. R. Van Devender. 1976.

Foods of the desert tortoise, *Gopherus agassizii*, in Arizona and Utah. Herpetologica 32:247-251.

Hardenbrook, D. B. 1989. Results from the Trout Canyon desert tortoise study plot, Clark County, Nevada. Unpubl. Rept., U.S. Bureau of Land Management, Las Vegas Dist. 29pp.

Hovik, D. C., and D. B. Hardenbrook. 1989. Summer and fall activity and movements of desert tortoises (*Gopherus agassizii*) in Pahrump Valley, Nevada. Paper presented at Desert Tortoise Council Symp., Laughlin, Nevada.

Jacobson, E. R., and J. M. Gaskin. 1990. Clinicopathologic investigations on an upper respiratory disease of free-ranging tortoises, *Xerobates agassizii*. Rept. to U.S. Bureau of Land Management, Calif. Desert Dist., Riverside, Contr. No. CA 950-CT9-28. 37+pp.

Jaeger, E. C. 1961. Desert wildlife. Stanford University Press, Stanford. 308pp.

Jarchow, J. L., and C. L. May. 1989. Report on investigation of desert tortoise mortality on the Beaver Dam Slope, Arizona and Utah. Neglected Fauna International, Rept. for Ariz. Game and Fish Dept., Ariz. Strip Dist. BLM, Cedar City Dist. BLM, Utah Div. Wildlife Resources. 23pp.

Karl, A. 1979. An ecological study of a population of desert tortoises, *Gopherus agassizii*, in southern Nevada. Unpubl. Rept., U.S. Bureau of Land Management, Denver Service Center, Contr. No. YA-512-CT9-90. 84pp.

-----. 1979. An ecological study of a population of desert tortoises, *Gopherus agassizii*, in Clark County, Nevada. Unpubl. Rept., U.S. Bureau of Land Management, Denver Service Center, Contr. No. YA-512-CT9-90.

-----. 1980. The ecology of a population of desert tortoises, *Gopherus agassizii*, near Pahrump, Nevada. Unpubl. Rept., U.S. Bureau of Land Management, Denver Service Center, Contr. No. YA-512-CT9-90.

Knowles, C. J., and P. R. Knowles. 1990. A survey for diseased desert tortoises in and near the Desert Tortoise Natural Area, spring 1989. Paper presented at Desert Tortoise Council Symp., 30 March-2 April, Victorville, Calif.

Luckenbach, R. A. 1976. Field estimates of California populations of *Gopherus agassizii*: I. Procedures. Pages 22-29 in N. J. Engberg, S. Allan, and R. L. Young, eds. Proc. 1976 Symp. Desert Tortoise Council. Long Beach. 131pp.

Medica, P. A., R. B. Bury, and F. B. Turner. 1975. Growth of the desert tortoise (*Gopherus agassizii*) in Nevada. Copeia 1975:639-643.

Miller, A. H., and R. C. Stebbins. 1964. The lives of desert animals in Joshua Tree National Monument. University of Calif. Press, Berkeley. 452pp.

Mortimer, C., and P. Schneider. 1983. Population studies of the desert tortoise (*Gopherus agassizii*) in the Piute Valley study plot of southern Nevada. Nevada Dept. of Wildlife. 60pp.

Nagy, K. A., and P. A. Medica. 1986. Physiological ecology of desert tortoises in southern Nevada. Herpetologica 42(1):73-92.

Nicholson, L., and K. Humphreys. 1981. Sheep grazing at the Kramer study plot, San Bernardino County, California. Pages 163-194 in K. A. Hashagen and E. St. Amant, eds. Proc. 1981 Symp. Desert Tortoise Council. Long Beach. 212pp.

Sierra Delta Corporation/SWCA, Inc. 1989. Desert tortoise survey: Piute Valley, Mormon Mesa, Sand Hollow Plots, survey summary. Unpubl. Rept., U.S. Bureau of Land Management, Las Vegas Dist., Contr. No. NV950-CT9-012. 10+pp.

Spang, E. F., G. W. Lamb, F. Rowley, W. H. Radtkey, R. R. Olendorff, E. A. Dahlem, and S. Slone. 1988. Desert tortoise habitat management on the public lands: A rangewide plan. U.S. Bureau of Land Management, Div. of Wildlife and Fisheries, Washington, DC. 23pp.

SWCA, Inc. 1990. Results of 1990 vegetation and tortoise surveys of the Gold Butte permanent study plot, Nevada. Unpubl. Rept., U.S. Bureau of Land Management, Nevada State Office, Contr. No. NV950-CT9-024. 8+pp.

USDI Bureau of Land Management, USDI Fish and Wildlife Service, and California Department of Fish and Game. 1989. Environmental assessment for selected control of the common raven to reduce desert tortoise predation in the Mojave desert, California. U.S. Bureau of Land Management, Calif. Desert Dist., Riverside. 33pp.

U.S. Department of the Interior. 1989. Emergency determination of endangered status for the Mojave population of the desert tortoise. Fed. Register 54(19):32326-32331.

-----. 1990. Determination of threatened status for the Mojave population of the desert tortoise. Fed. Register 55(63):12178-12191.

Waser, N. M., and M. V. Price. 1981. Effects of grazing on diversity of annual plants in the Sonoran desert. Ecologia 50:407-411.

Weinstein, M. N., and K. H. Berry. 1988. Analysis of growth in the desert tortoise in California. Unpubl. Rept., U.S. Bureau of Land Management, Contr. No. CA950-CT7-003. 34pp.

Wilson, R. W., and R. D. Stager. nd. Association between soils and desert tortoise population densities and distribution, Piute Valley, Nevada. Unpubl. Rept. 17pp.

Woodbury, A., and R. Hardy. 1948. Studies of the desert tortoise, *Gopherus agassizii*. Ecol. Monogr. 18:145-200.

ATTACHMENT I

BACKGROUND INFORMATION REGARDING LIVESTOCK GRAZING
IN DESERT TORTOISE HABITAT IN NEVADA

A. Stateline Resource Area

Table 1: Type of Studies Per Allotment

			Type of Studies				
Allotment	Mgt. Category	Status A/I(1)	Freq.	Cover	Util.	Use Map	Photo Trend
Acton-Farrier	C	A(88)				x	
Arrow Canyon	M	A(90)				x	
Azure Ridge (2)	C	A					
Billy Goat Peak	I	A(90)			x	x	x
Bunkerville	I	A(90)	x	x	x	x	x
Christmas Tree Pass	I	A(90)	x	x	x	x	x
Crescent Peak	I	A(90)	x	x	x	x	x
Flat Top Mesa	C	A(90)			x	x	x
Gold Butte	I	A(90)	x	x	x	x	x
Hen Springs	M	A(90)			x	x	x
Hidden Valley	I	A(90)			x	x	x
Ireteba Peaks	I	A(90)	x	x	x	x	x
Jack Rabbit	C	A(89)					
Jean Lake	I	A(90)	x	x	x	x	x
Lower Mormon Mesa	C	A(90)				x	
Lucky Strike Canyon	M	A(90)			x	x	x
McCullough Mountain	I	A(90)	x	x	x	x	x
Mesa Cliff	C	A(87)					
Mesquite Comm.(2)	I	A					
Mt. Stirling	I	A(90)				x	
Roach Lake	C	A(88)				x	
Rox	C	A(90)				x	
Spring Mountain (3)	C	I	x	x	x	x	x
Toquop Sheep	C	A(89)				x	
Upper Mormon Mesa	I	A(90)			x	x	x
Wheeler Wash	I	A(90)			x	x	
White Basin	I	A(90)			x	x	x

Table 1: cont..

ALLOTMENTS NOT USED SINCE 1985		
Allotment	Mgt. Category	Status A/I(1)
Ash Meadows	NA	I
Carson Slough	NA	I
Black Butte	C	I
County Line	C	I
Dry Lake	C	I
Glendale	C	I
Grapevine/Rocky Valley	NA	I
Indian Springs	C	I
Kyle Canyon	C	I
Las Vegas Valley	C	I
Lime Springs (2)	C	I
Muddy Mountain	C	I
Muddy River	C	I
Newberry Mountains	C	I
Overton Arm	C	I
Pittman Well	C	I
Pulsipher Wash	C	I
River Mountain	C	I
South Point	C	I
Stump Spring	C	I
Sunrise Mountain	C	I
Table Mountain	C	I
Ute	C	I
Virgin River Bottom	C	I
Wheeler Slope	C	I
Younts Spring	C	I

(1) A = Active, I = Inactive, (88) Last year used
(2) Administered by the Arizona Strip District
(3) Studies established in the Red Rock Wild Horse and Burro Herd Use Area

Table 2: Ecological Status Per Allotment

ECOLOGICAL STATUS (Acreage Per allotment)					
Allotment and Associated Tortoise Habitat	Acreage	Early	Mid	Late	PNC
Acton-Farrier	45,536			27,322	18,214
Arrow Canyon	88,448			57,491	30,957
Azure Ridge (1)	6,154	123	1,477	3,631	9,231
Billy Goat Peak	49,133	491	9,827	24,075	14,740
Black Butte	36,312			25,418	10,894
Bunkerville	128,869	2,577	30,928	76,033	19,330
Christmas Tree Pass	72,112	721	17,307	43,267	10,817
County Lin	6,720			4,704	2,016
Crescent Peak	119,320		4,773	101,422	3,125
Dry Lake	69,399			69,399	
Flat Top Mesa	5,338		53	1,815	3,470
Glendale	22,353			22,353	
Gold Butte (3)	172,549	17,255	41,412	88,000	25,882
Hen Springs	22,756	228	2,276	13,654	6,599
Hidden Valley	69,436		694	48,605	20,136
Indian Springs	6,786			1,357	5,429
Ireteba Peaks	252,313		2,523	176,619	73,171
Jack Rabbit	3,054		152	2,596	305
Jean Lake	137,217	1,372	13,722	102,913	19,210
Kyle Canyon	29,620			17,772	11,848
Las Vegas Valley	62,243			62,243	
Lime Springs (1)	2,384	24	238	1,883	238
Lower Mormon Mesa	43,640		873	17,456	25,311
Lucky Strike Canyon	98,420			49,210	49,210
McCullough Mountain	230,272	6,908	16,119	145,071	62,173
Mesa Cliff	14,072		704	11,258	2,111
Mesquite Community (1)	13,106		655	10,485	3,277
Mt. Stirling	126,320		6,316	82,108	37,896
Muddy Mountain	189,409		1,788	53,645	33,975
Muddy River	20,081			14,057	6,024
Newberry Mountains	35,352			24,746	10,606
Overton Arm	2,716		136	2,173	407
Pittman Well	39,595				39,595
Pulsipher Wash	3,328			2,829	333

Table 2: Cont..

ECOLOGICAL STATUS (Acreage Per allotment)					
Allotment and Associated Tortoise Habitat	Acreage	Early	Mid	Late	PNC
River Mountain	10,371			2,593	7,778
Roach Lake	18,718		1,872	5,615	11,231
Rox	21,736		2,174	6,521	13,041
South Point	13,980			9,786	4,194
Spring Mountain (2)	237,890	9,516	11,894	133,218	83,262
Stump Spring	50,535			35,374	15,161
Sunrise Mountain	34,272			6,854	27,418
Table Mountain	88,537			53,122	35,415
Toquop Sheep	29,793	1,490	1,490	25,323	1,490
Ute	70,280			63,252	7,028
Upper Mormon Mesa	47,659		2,860	28,595	16,204
Virgin River Bottom	90			90	
Wheeler Slope	72,277			43,366	28,911
Wheeler Wash	70,115	2,103	3,506	53,989	23,839
White Basin	89,790		2,694	78,117	8,979
Younts Spring	14,401			8,641	5,760
TOTAL	3,054,333	42,808	178,583	2,015,472	817,470
Percent of Resource Area Per Seral Stage		1%	6%	66%	27%

(1) Administered by the Arizona Strip District.
(2) Studies established in the Red Rock Wild Horse and Burro Herd Use Area
(3) Approximately _____ wild burros were removed from the Gold Butte Herd Management Area in November 1990. The excess burro population, along with fires, is the cause of the relatively high proportion of early seral stage vegetative community within the Gold Butte allotment. The burro population had exceeded the ecological balance. The recent capture will correct this situation by adjusting the population downward from approximately _____ burros to an estimated _____ burros.

Table 3: Utilization Levels in Key Areas

Allotment	Key Area	Key Species	Average Percent Use on Key Species
Acton-Farrier (2)	NA		
Arrow Canyon (2)	NA		
Azure Ridge (1,2)	NA		
Billy Goat Peak (2)	NA		
Bunkerville			
	KA 1	Hiri	33
		Epne	20
		Krpa	10
	KA 2	Epne	42
		Stps3	49
		Pugl	31
		Mupo	45
	KA 3	Stsp3	48
		Spam3	37
		Pugl	12
	KA 4	Pugl	6
		Prfa	6
Christmas Tree Pass			
	KA 1	Hiri	21
		Krpa	9
		Amdu2	8
	KA 2	Mupo2	17
		Hiri	24
		Epne	16
		Spam2	24
Crescent Peak			
Pasture 1	KA 1	Boer	21
		Hiri	30
		Epne	32
Pasture 2	KA 1	Hiri	26
		Epne	28
		Mupo	39
	KA 2	Hiri	8
		Mupo	5
		Krpa	1
	KA 3	Epne	21
		Boer	15
		Hiri	18
	KA 4	Boer	10
		Hiri	15
		Epne	12
	KA 5	Boer	32
		Hiri	27
		Epne	33
Pasture 3	KA 1	Boer	35
		Hiri	43
		Epne	39
	KA 2	Hiri	24
		Epne	22
		Krpa	12

Table 3: Cont..

Allotment	Key Area	Key Species	Average Percent Use on Key Species
Crescent Peak			
Pasture 4	KA 1	Amdu	8
	KA 2	Hiri	29
		Krpa	48
		Spcr	20
	KA 3	Hiri	11
		Epne	30
Pasture 5	KA 1	Hiri	35
		Mupo	34
	KA 2	Hiri	17
		Epne	45
		Mupo	41
		Krpa	14
	KA 3	Hiri	13
		Mupo	33
Flat Top Mesa			
	KA 1	Orhy	9
		Spcr	16
		Hiri	11
Gold Butte			
	KA 1	Hiri	28
		Eula	30
		Mupo	39
	KA 2	Pugl	21
		Prfa	19
	KA 3	Krpa	14
		Epne	20
Hen Springs			
	KA 1	Hiri	25
		Stsp	20
		Epne	31
		Orhy	32
	KA 2	Eula	43
		Epne	44
		Assc	3
Hidden Valley			
	KA 1	Hiri	4
		Orhy	8
		Spcr	4
	KA 2	Hiri	NA
		Orhy	NA
		Spcr	NA
Ireteba Peaks			
	KA 1	Hiri	29
		Epne	24
		Spcr	30
	KA 2	Hiri	29
		Spcr	78
		Mupo	48
	KA 3	Hiri	8
		Mupo	9
	KA 4	Hiri	14
		Mupo	14
		Stsp	37

Table 3: Cont..

Allotment	Key Area	Key Species	Average Percent Use on Key Species
Jack Rabbit (2)	NA		
Jean Lake			
	KA 1	Boer	15
		Mupo	19
		Stsp	25
		Epne	24
	KA 2	Hiri	54
		Mupo	41
		Stsp	41
		Epne	33
		Krpa	14
	KA 3	Hiri	18
		Orhy	43
		Spcr	34
Lower Mormon Mesa (2)	NA		
Lucky Strike Canyon			
	KA 1	Stsp	29
		Epne	29
	KA 2	Stsp	26
		Orhy	40
		Epne	24
McCullough Mountain			
	KA 1	Boer	28
		Hiri	24
		Epne	39
	KA 2	Hiri	46
		Mupo	66
	KA 3	Hiri	33
		Mupo	31
		Epne	29
		Spam3	43
	KA 4	Hija	20
		Boer	21
		Spam3	25
		Epne	23
Mesa Cliff (2)	NA		
Mesquite Comm.(1,2)	NA		
Mt. Stirling (2)	NA		
Roach Lake (2)	NA		
Rox (2)	NA		
Toquop Sheep (2)	NA		
Upper Mormon Mesa			
	KA 1	Hiri	25
		Orhy	21
		Spcr	14

Table 3: Cont..

Allotment	Key Area	Key Species	Average Percent Use on Key Species
Wheeler Wash			
	KA 1	Orhy	25
		Stsp	29
		Epne	29
	KA 2	Stsp	46
	KA 3	Epne	22
	KA 4	Epne	18
		Stsp	9
		Orhy	5
White Basin			
	KA 1	Epne	36
	KA 2	Orhy	21
		Epne	13
		Hiri	15

(1) Administered by the Arizona Strip District.
(2) No data Available.

Table 4 Utilization Levels (Use Patterns) by Allotment

Allotment Name	Allotment Total Acreage	Use Pattern Mapping (acreage of total allotment)					
		No Use	Slight	Light	Moderate	Heavy	Severe
Acton-Farrier(2)							
Arrow Canyon(2)							
Azure Ridge(2)							
Billy Goat Peak	49,133	10,293	24,567	9,827	3,931	491	25
Bunkerville	128,869	5,412	85,827	21,006	13,016	3,608	0
Christmas Tree Pass	72,112	18,028	33,763	14,422	5,769	87	43
Crescent Peak	119,320	0	88,655	23,864	6,682	119	0
Flat Top Mesa	5,338	1,868	2,879	587	3	1	0
Gold Butte(1)	172,549	43,137	60,047	9,318	4,831	26,745	28,471
Hen Springs	22,756	0	11,833	9,956	887	80	0
Hidden Valley	69,436	34,718	19,720	10,415	4,166	347	69
Ireteba Peaks	252,313	106,552	100,925	30,278	12,616	1,918	25
Jack Rabbit(2)							
Jean Lake	137,217	0	92,800	34,304	6,861	3,156	96
Lower Mormon Mesa	43,640	8,728	26,533	5,237	1,920	1,178	39
Lucky Strike Canyon	98,420	29,526	61,119	7,086	640	49	0
McCullough Mountain	230,272	34,541	114,215	57,568	23,027	553	207
Mesa Cliff(2)							
Mesquite Comm.(2)							
Mt. Stirling	126,320	76,424	37,896	8,842	2,526	632	0
Roach Lake	18,718	4,006	9,359	3,219	2,134	0	0
Rox	21,736	4,412	6,695	9,238	1,109	283	0
Spring Mountain(2)							
Toquop Sheep	29,793	8,342	19,803	1,609	0	39	0
Upper Mormon Mesa	47,659	4,480	38,437	3,860	763	81	38
Wheeler	70,115	14,023	44,719	10,307	982	42	42
White Basin	89,790	26,937	51,988	5,118	5,208	539	0
Acreage Totals	1,805,506	431,428	931,780	276,061	97,069	39,946	29,056
Percent of Active Allotments Per Use Level		24	52	15	5	2	2

(1) The high instance of heavy to severe use in the Gold Butte Allotment is mostly in the Herd Management Area along Lake Mead and can not be attributed to cattle grazing. A wild burro capture is occurring in the fall of 1990 to correct the situation.

(2) No data available.

Table 5: Apparent Trend Per Allotment

Allotment	Key Area	Apparent Trend		
		Down	Static	Up
Acton-Farrier (2)	NA		X	
Arrow Canyon (2)	NA		X	
Azure Ridge (1)	NA			
Billy Goat Peak (2)	NA	X	X	
Bunkerville				
	KA 1		X	
	KA 2		X	
	KA 3		X	
	KA 4		X	
Christmans Tree Pass				
	KA 1		X	
	KA 2		X	
Crescent Peak				
Pasture 1	KA 1		X	
Pasture 2	KA 1		X	X
	KA 2		X	
	KA 3		X	
	KA 4		X	
	KA 5		X	
Pasture 3	KA 1		X	
	KA 2		X	
Pasture 4	KA 1		X	
	KA 2		X	
	KA 3		X	
Pasture 5	KA 1			X
	KA 2			X
	KA 3			X
Flat Top Mesa (2)	NA		X	
Gold Butte				
	KA 1		X	
	KA 2		X	
	KA 3		X	
	KA 4	X		
Hen Springs				
	KA 1	X		
	KA 2	X		
Hidden Valley (2)				
	KA 1		X	
	KA 2		X	
Ireteba Peaks				
	KA 1		X	
	KA 2		X	
	KA 3	X		
	KA 4		X	
Jack Rabbit (2)	NA		X	
Jean Lake				
	KA 1		X	
	KA 2		X	
	KA 3		X	
	KA 4	X		

Table 5: Cont..

Apparent Trend				
Allotment	Key Area	Down	Static	Up
Lower Mormon Mesa (2)	NA		X	
Lucky Strike Canyon (2)				
	KA 1		X	
	KA 2		X	
McCullough Mountain				
	KA 1			X
	KA 2		X	
	KA 3			X
	KA 4		X	
	KA 5			X
Mesa Cliff (2)	NA		X	
Mesquite Comm.(1,2)	NA		X	
Mt. Stirling (2)	NA		X	
Roach Lake (2)	NA		X	
Rox (2)	NA		X	
Toquop Sheep (2)	NA		X	
Upper Mormon Mesa (2)				
	KA 1		X	
Wheeler Wash (2)				
	KA 1		X	
	KA 2		X	
	KA 3		X	
White Basin (2)				
	KA 1		X	
	KA 2		X	

(1) Administered by the Arizona Strip District.
(2) Either no key area and/or frequency trend study has been established in the allotment. The trend has been estimated through available monitoring data and professional judgement.

B. Caliente Resource Area

Table 1. Types of Studies Per Allotment.

ALLOTMENT	STATUS	FREQ.	COVER	UTIL.	USE MAP	PHOTO TREND
BEACON	I			X	X	
BOULDER SPRING	A	X	X	X	X	X
BREEDLOVE	A	X	X	X	X	X
BUCKHORN	A	X	X	X	X	X
DELAMAR	A	X	X	X	X	X
FLAT TOP MESA		ADMINISTERED BY THE STATELINE RESOURCE AREA				
GARDEN SPRING	A	X	X	X	X	X
GOURD SPRING	A	X	X	X	X	X
GRAPEVINE	A	X	X	X	X	X
HENRIE	A	X	X	X	X	X
JACKRABBIT		ADMINISTERED BY THE STATELINE RESOURCE AREA				
LOWER LAKE EAST	A	X	X	X	X	X
LOWER LAKE WEST	A	X	X	X	X	X
MORRISON-WENGERT	A	X	X	X	X	X
MORMON PEAK	A	X	X	X	X	X
PAHRANAGAT EAST	A	X	X	X	X	X
PAHRANAGAT WEST	A	X	X	X	X	X
PULSIPHER WASH		ADMINISTERED BY THE STATELINE RESOURCE AREA				
ROX/TULE	A	NO STUDIES ESTABLISHED TO DATE.				
SAND HOLLOW	A	X	X	X	X	X
SNOW SPRING	A	X	X	X	X	X
SUMMIT SPRING	A	X	X	X	X	X
TERRY		ADMINISTERED BY THE DIXIE RESOURCE AREA				
WHITE ROCK	A	X	X	X	X	X

Table 2. Ecological Status[1] Per Allotment.

Allotment Name	Allotment Acres	Ecological Status Early	Mid	Late	PNC	ESI Total Acres [2]
Grapevine	33,328	0	1,165	14,597	11,654	27,416

[1] Ecological Site Inventory has not been completed for other allotments which are included within desert tortoise habitat.

[2] Difference in acreage figures between allotment total and ESI total acres due to rock outcrop areas.

Table 3. Utilization Levels in Key Areas

ALLOTMENT	KEY AREA	SPECIES	AVERAGE % USE
BEACON	UTILIZATION DATA PROVIDED WITH SAND HOLLOW ALLOTMENT.		
BOULDER SPRING	1	HIJA	42
		EPNE	33
	2	EPNE	28
		ARPU	25
	3	HIJA	28
		EPNE	24
		ARPU	25 [1]
	Supplemental 1	HIJA	30 [1]
		ARPU	41 [1]
BREEDLOVE	1	EPNE	4 [4]
		HIRI	4 [4]
		ARPU	5 [2]
BUCKHORN	1	EULA	37 [2]
		HIJA	37
		ORHY	52 [4]
		EULA	17 [3]
	2	SIHY	25 [4]
		ORHY	32
		EULA	27 [2]
		HIJA	22
		EULA	12 [2]
	3	HIRI	13 [4]
		SIHY	11 [4]
		ORHY	20 [1]
		GRSP	6 [4]
		EPNE	12 [4]
	Supplemental 1	HIJA	30 [2]
		EULA	26 [2]
		ORHY	48 [1]
	Supplemental 2	HIJA	39 [2]
		EULA	29 [2]

DELAMAR			
Pasture 1	1	HIJA	33
		ORHY	49
		EULA	41
		EPNE	20
	Supplemental 1	EULA	51 [2]
		ORHY	54 [3]
		HIJA	51 [3]
	Supplemental 2	HIJA	17 [2]
		SIHY	7 [2]
		EPNE	5 [2]
Pasture 2	1	AGCR	64
	2	STCO4	48
		EPNE	8
		PUGL	6
Pasture 3	1	HIJA	13
		SIHY	14
		EPNE	14
Pasture 4	1	HIRI	26
		EPNE	33
	2	HIRI	32
		EPNE	11 [1]
	3	HIRI	22
		EPNE	12 [4]
	4	EPNE	22 [1]
FLAT TOP MESA	ADMINISTERED BY STATELINE RESOURCE AREA		
GARDEN SPRING	1	HIRI	49
		EPNE	43
	2	HIRI	32
		EPNE	29 [4]
	3	EPNE	24
		ARPU	24 [2]
		HIRI	31 [2]
GOURD SPRING	1	HIRI	32
		EPNE	26
	2	HIRI	21
		EPNE	22
	3	HIRI	0
		EPNE	2
GRAPEVINE			
Pasture 1	1	HIRI	22 [4]
		EPNE	7 [2]
	2	HIRI	28 [4]
		ORHY	35 [2]
		ATCO	31 [2]
		GRSP	23 [2]
Pasture 2	1	HIRI	8 [3]
		ORHY	4 [3]
		EPNE	1 [3]
	2	HIJA	36 [3]
	5	HIRI	67 [1]
Pasture 3	1	HIRI	41 [4]
		ORHY	25 [1]
		ATCO	43 [1]
	2	HIRI	29 [4]
		EPNE	10 [4]
	3	HIRI	27 [4]
		ORHY	19 [3]
		ERIN4	10 [4]
		ATCO	33 [1]

HENRIE	1	EPNE	10 [4]
		HIRI	10 [4]
		ORHY	34 [1]
	2	EPNE	12 [4]
		ARPU	12 [4]
JACKRABBIT	ADMINISTERED BY STATELINE RESOURCE AREA		
LOWER LAKE EAST	1	HIRI	2 [4]
		EPNE	4 [4]
	2	HIRI	2 [1]
		EPNE	12 [1]
LOWER LAKE WEST	1	HIJA	37 [3]
		ORHY	34 [3]
		EPNE	20 [3]
		ARSP	28 [1]
	2	HIJA	36 [3]
		ORHY	32 [3]
		EPNE	21 [3]
		ARSP	34 [1]
MORRISON-WENGERT	1	HIJA	5 [1]
		EPNE	7 [2]
		PUGL	7 [1]
		ARIST	6 [1]
	2	ARPU	15 [2]
		EPNE	7 [2]
MORMON PEAK	1	ARPU	16 [2]
		PUGL	13 [2]
		EPNE	15 [2]
PAHRANAGAT EAST	1	HIRI	25
		EPNE	9
		ATCO	5
		GRSP	10 [2]
	2	HIRI	28
		ORHY	41 [4]
		EULA	4 [1]
		EPNE	10 [1]
		ATCO	6 [1]
	3	ORHY	15
		ATCO	3
PAHRANAGAT WEST	1	EPNE	29 [2]
		HIRI	42 [1]
		ARSP	11 [1]
	2	HIRI	49 [2]
		EPNE	41 [2]
		GRSP	5 [1]
	3	EPNE	2
	4	ORHY	39 [1]
		HIRI	8 [1]
		EPNE	6 [1]
PULSIPHER WASH	ADMINISTERED BY STATELINE RESOURCE AREA		
ROX/TULE	NO STUDIES ESTABLISHED TO DATE.		
SAND HOLLOW	1	HIRI	23
		EULA	23
		KRPA	18
		ORHY	52 [2]
	2	HIRI	16
		SPCR	23 [4]
		EPTO	8 [3]
		ORHY	28
		KRPA	11 [2]

SNOW SPRING	1	EPNE	20	[4]
		CORA	20	[4]
	2	EPNE	21	[4]
		HIRI	23	[4]
		CORA	34	[1]
UMMIT SPRING	1	HIRI	26	
	2	HIRI	40	[4]
TERRY	ADMINISTERED BY THE DIXIE RESOURCE AREA			
WHITE ROCK	1	HIRI	43	
		EPNE	38	
	2	HIRI	31	[4]
		ORHY	50	[1]
		EPNE	42	[1]
	3	HIRI	31	[4]
		EPNE	49	[2]
	Supplemental 1	HIRI	74	[1]

[1] Species Averaged One Year.
[2] Species Averaged Two Years.
[3] Species Averaged Three Years.
[4] Species Averaged Four Years.

Table 4. Utilization Levels (Use Patterns) By Allotment

ALLOTMENT	ACRES	NON-USE	SLIGHT	LIGHT	MODERATE	HEAVY	SEVERE	TOTAL MAPPED [1]
BEACON	5,682	Acreage included with Sand Hollow						
BOULDER SPRING	13,537	1,110	675	3,645	4,665	3,360		13,455
BREEDLOVE	112,755		10,780	4,350				15,130
BUCKHORN	82,968	12,540	11,760	28,900	13,200	3,360	420	70,180
DELAMAR	240,755	Pasture Five, no use pattern map data available.						
FLAT TOP MESA	6,033	ADMINISTERED BY THE STATELINE RESOURCE AREA						
GARDEN SPRING	38,823		2,820	6,260	8,600	7,280	1,260	26,220
GURD SPRING	101,125		5,840	18,160	4,240	920	580	29,740
GRAPEVINE	33,328		5,820	8,480	4,780	2,060	80	21,220
HENRIE	131,796		26,760	20,880	1,940	80	60	49,720
JACKRABBIT	9,755	ADMINISTERED BY THE STATELINE RESOURCE AREA						
LOWER LAKE EAST	50,317	Low priority "C" allotment, no use pattern data available.						
LOWER LAKE WEST	57,000				8,240	9,280		17,520
MORRISON-WENGERT	60,240		11,580	24,120	16,620			52,320
MORMON PEAK	82,296		4,320	2,820	240	80	20	7,480
SHRANAGAT EAST	34,146		2,760	5,180	4,480	240	80	12,740
SHRANAGAT WEST	70,138		4,880	8,200	17,720	14,280	9,500	54,580
SULSIPHER WASH	3,408	ADMINISTERED BY THE STATELINE RESOURCE AREA						
TROX/TULE	25,870	Use pattern data not available.						
SAND HOLLOW	35,174		10,220	11,500	660	260	140	22,780
SNOW SPRING	44,042		11,620	27,200	4,800	380		44,000
SUMMIT SPRING	18,035		4,700		1,700	1,660	160	8,220
TERRY	30,163	ADMINISTERED BY THE DIXIE RESOURCE AREA						
WHITE ROCK	32,916		600		12,640	6,240	740	20,220
TOTAL ACRES	1,339,871	19,890	124,184	171,975	106,085	49,920	13,040	485,094

[1] Acres listed under "Total Mapped" are those acreages that have use pattern data available at this time.

Table 5. Water Related Projects Associated With Desert Tortoise Habitat.

Type Water Project	Existing Totals	Proposed Totals
Water Troughs	42	18
Windmills	4	0
Reservoirs	21	0
Springs:		
Unimproved	4	0
Improved	17	0
Water Hauls	8	0
Catchments	1	0
Totals	97	18

ATTACHMENT II

SUMMARY OF DESERT TORTOISE STUDY PLOT DATA

Summary of Desert Tortoise
Study Plot Data

Study Plot	Year Read	Live Tortoises Found >180mm ≤180mm	Age Classes (Percent) >180 / ≤180	Population Estimate Per Sq Mile >180mm All	Tortoise Remains Found	Crude Mortality Rate (Percent)	Sex Ratio M:F >180mm	Remarks
Last Chance	1980	9 1	90 10	- 5-10	53	59.0	-	1) 78% of animals foun of senescent age - thought tortoise population would no last 10 yrs. 2) Te mortalities had predator tooth marks. 3) Three tortoises m have been shot. 4 Burro and/or horse sig in the plot.
Sheep Mtn.	1979	22 10	69 31	36 50-65 (Schneibel)	7	6-9	1:0.83	1) Two tortoises i pop. estimate found of plot. 2) Plot covere only 1.5 times. 3) Tw remains had predato chew marks. 4) 15 of 3 tortoises had surke scutes including thre juveniles and immatures. 5) 55% o adults past prime reproductive potential

Sheep Mtn.	1984	32 27	54	46	47±14 74±24 (Bailey Binomial)	40 (22 in past yr. & all <180mm)		15:17	1) Four tortoises observed eating perennial vegetatio which was very poo production - annua forage production we 0. 2) 86% (19) of tortoises marked i 1979 were recaptured 3) 19 of the 22 remain (all <180mm) was preye or scavenged on by ravens. 4) Five of 1 juvenile tortoises ha sunken scutes.
Xmas Tree Pass	1985	100 67	60	40	159±27 219±43	Not Available	4.3	51:49	1) Heavy avian predation on young tortoises. These remains were found mostly under powerline and fences off-site. 2) Adult pop. base upon >140mm.
Cold Butte	1986	81 7	92	8	96±15 131±28	20 (11 last four yrs)	2.0	40:41	1) Very little recruitment appears t be occurring. Populationmay crash a older animals are lost. 2) Only slight to light grazing, howeve water was available t cattle in the area fiv years or earlier.

Gold Butte	21990	29 3		91	9	54±15 132±16	62 total remains 7 remains from 1986	2.0-15.5	11:18	1) # of tortoises fou dropped from 88 in 198 to 32 in 1990 howeve population estimate fo all animals when comparing 1986 & 199 data using Bailey Binomial is very clos (i.e. 131±28 to 132±16). 2) 7 of tortoises marked i 1986 found in 1990 fo a 2% annual crude mortality, however total of 62 remain found for potentia mortality of 15.3%. 3 Recruitment still appears to be low. *1st pop. est. for 199 data only, 2rd est. fo 1986 - 1990 comparison
Coyote Springs	1986	44 34		56	44	49±4 96±6	36	3.4	14:29	1) Sex ratio very unusual - twice as man females as males. 2 Contractor was concerned about lack o spring forage durin the survey year. 3) N sign of avian predatio - one juvenile tolerab kit fox, and eight remains had predato chew marks. 4) Grazing hasn't occurre on the plot for mor than ten years.

Trout Canyon	1987	24 7		77	23	28±10 -	31 (21 complete enough for examination)	6.7 (For Adults Only)	1:1	1) Yearlong cattle grazing until 1970s. Some wild horse use during winter months. 2) One burrow crushed by horses. 3) 23% (7 of tortoises of various age classes had surface scutes. 4) Eight of 2 shell remains showed signs of bone thinning 5) No avian predation indicated but 6 shells had predator chew marks.
Morrison Mesa	1989	46 8		85	15	64±23 77±27	80 (22 that could be size classed -5 of these <180mm	5.0-25.0 (See Remarks)	20:25	1) Two shells remained had sign of avian predation, two had predator chew marks and two crushed from livestock or vehicles 2) 59% of live tortoises had surface scutes - across all age classes (65% >180mm 25% ≤180mm). 3) Sheep grazing occurs every year between March and May. 4) Two tortoises had signs of URDS - 1 with runny nose, 1 with foggy eyes. 5)Variation in crude mortality rate is due to comparing total mortality over 20 yrs and taking only those mortalities believed to have occurred over the past four years only
Sand Hollow	1989	5 2		71	29	8±10 16±14	26 (Over 20yrs)	6.5-16.0 (See Remarks)	2:3	1) Mortality variation based upon same as remark #5 at Morrison Mesa. 2) Cattle grazing from October to middle of May. 3) One adult female had surface scutes.

Paiute Valley	1979	50 34	60	40	74-89 125-150 (Schnabel)	10	?	22:28	1) 30 day census conducted. 2) Cattl grazing occurred mos years during the winte and spring.
Paiute Valley	1983	29 52	36	64	30±7 122±45	109 (77 > 180mm & 32 ≤180mm)	18-22 (for all) 24 (for adults)	17:13	1) Major die-off occurred on or abou 1981 - 109 tortoise died (77 >180mm & 3 ≤180mm). 2) Cause of die-of unknown. 3) Adult animals almost half o what was found in 1979 however animals ≤180m increaseddramatically 3) Unlike Xmas Tre Pass, tortoise remain were not found unde five active raptor nests in the area (3 raven, 1-golden eagle 1-red-tailed hawk).
Paiute Valley	1987	29 19	60	40	- 114	37	8.0	?	1) The plot was no covered fully durin the survey, therefor the researcher use population data fo half the plot. 2) Ratio of adults to young reverted back t 1979 level, howeve only 58% as many adult found - same as 1983. 3) 14.7% of tortois remains showed predato chew marks.

Paiute Valley	1989	30 16	65	35	38±16 67±27 (Bailey Binomial)	33 (70 since 1983)	12-29 (1983-89) 17-41 (1987-89)	17:13	1) Two tortoises ha sunken scutes - on adult, one subadult. 2) Population estimat may be due to drough year in which tortois activity was greatl reduced therefore fewe tortoises counted O the Bailey Binomia method may underestimate the population. 3) Th mortality rate appear to be quite high eve if the population est is lower than what really occurs. 4) Tw shell remains showe avian predation, eigh had predator chew marks, and one was crushed by cattle o vehicle.

Map key of Las Vegas District grazing allotments

39 ACTON-FARRIER
42 ARROW CANYON
26 AZURE RIDGE
58 BEACON
27 BILLY GOAT PEAK
10 BLACK BUTTE
63 BOULDER SPRING
51 BREEDLOVE
65 BUCKHORN
30 BUNKERVILLE
2 CHRISTMAS TREE PASS
4 CRESCENT PEAK
52 DELAMAR
22 DRY LAKE
64 ELGIN
45 FLAT TOP MESA
62 GARDEN SPRINGS
37 GLENDALE
25 GOLD BUTTE
49 GOURD SPRING
53 GRAPEVINE
55 HENRIE
31 HEN SPRINGS
7 HIDDEN VALLEY
16 INDIAN SPRINGS
3 IRETEBA PEAKS
47 JACKRABBIT
6 JEAN LAKE
19 KYLE CANYON
61 LIME MOUNTAIN
28 LIME SPRINGS
66 LOWER LAKE
32 LOWER MORMON MESA
18 LUCKY STRIKE
5 MCCULLOUGH MOUNTAIN
34 MESA CLIFF
29 MESQUITE COMMUNITY
50 MORMON PEAK
54 MORRISON-WENGERT
15 MT STIRLING
23 MUDDY MOUNTAINS
36 MUDDY RIVER
35 NEWBERRY MOUNTAINS
33 OVERTON ARM
67 PAHRANAGAT EAST
68 PAHRANAGAT WEST
40 PITTMAN WELL
46 PULSIPHER WASH
20 RIVER MOUNTAINS
8 ROACH LAKE
38 ROX
48 SAND HOLLOW
69 SIX MILE
59 SNOW SPRINGS
1 SOUTH POINT
11 SPRING MOUNTAIN
12 STUMP SPRINGS
57 SUMMIT SPRING
21 SUNRISE MOUNTAIN
9 TABLE MOUNTAIN
60 TERRY
44 TOQUOP SHEEP
43 UPPER MORMON MESA
41 UTE
17 WHEELER SLOPE
14 WHEELER WASH
24 WHITE BASIN
56 WHITE ROCK
13 YOUNTS SPRING

BLM LIBRARY
SC-653, BLDG. 50
DENVER FEDERAL CENTER
P. O. BOX 25047
DENVER, CO 80225-0047

7849

ER'S CARD

1991

uation for
tock grazing

	OFFICE	DATE RETURNED

(Continued on reverse)